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A Weekly Journal of the Mining and Mineral Industries

MARCH 20, 1920

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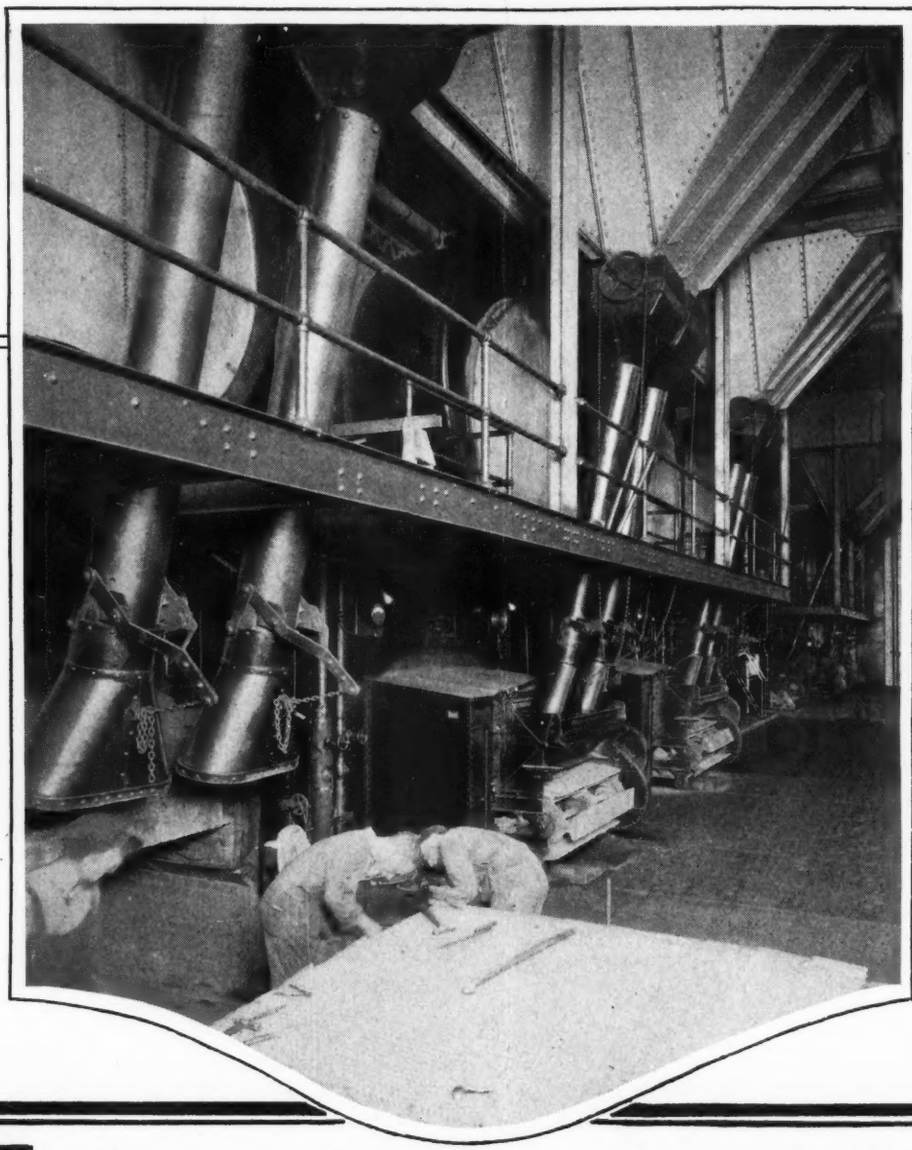

S-A Coal and Ash Handling Machinery at the Lake View Pumping Station

Above:
View of Boiler Room

Below:
Exterior of Pumping Station

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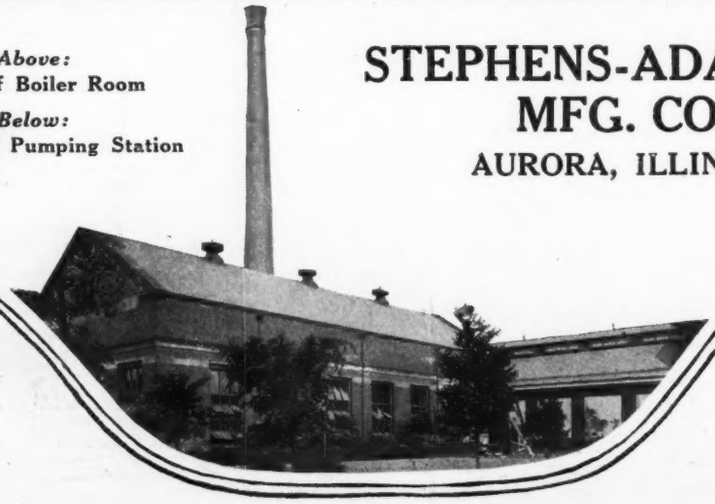

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Engineering and Mining Journal

A Weekly Journal of the Mining and Mineral Industries

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Volume 109 New York, March 20, 1920 *Number* 12

The Unionization of Engineers

THE action of the American Institute of Mining and Metallurgical Engineers, at the annual meeting in New York in February of this year, in approving of the prospect to unite not only the great national engineering societies, but the local engineering societies all over the country as well, into a great central organization for mutual protection and professional and political effectiveness, is of extraordinary significance. It is not a voluntary movement, but one compelled by the spirit of the times, which are moving swiftly toward a new type of social organization, which will have a vast influence over our government and development, if it does not become predominant.

Not many decades ago our social and industrial life was entirely unorganized. The main organization was that of our democratic government, by which representatives from certain states, or representing so and so much of the population, considered only numerically, were sent to city, state, or national legislatures, there to make the laws and, by the vote of the majority of such representatives, to decide the policy and institutions of the commonwealth.

As the first development, independent and opposed to this purely numerical and purely democratic organization, came the organization of capitalists—the amalgamation of groups of capitalists and the allying of such groups and their corporations with stronger and more powerful unions, which came to be called Trusts. The potent power of such combinations was recognized with terror and anger by the rest of the people, including the farmer, the laborer, and the consumer; and for years, even so late as the recent administration of Roosevelt, the remedy seemed to be to break up and destroy these combinations and their power. In the meantime, however, against such power, spontaneously in part, industrial workers—labor, as commonly so-called—began to organize, at first clumsily, later more surely and sanely, till now organized labor is powerful in the United States and in many other countries, and has won its way to recognition and respectability.

Against this new combination in restraint of trade, the anti-trust laws were never enforced, on account of the vast numbers involved; and with this laxity came a decrease of animosity toward organized capital, and saner appreciation of its usefulness. Organized labor has taken the helm in some countries, as in Australia, and is struggling to in the United States and England. To do so here, it has been diplomatically striving to extend its scope, so that it shall not represent a minority but a plurality at least; and, therefore, it has adopted a liberal and friendly attitude toward what would be in England termed the middle classes—the salaried classes—ranked them as laborers, and worked them into the general labor-union fold. Many groups have accepted the invitation; seeing the necessity of unionization as a matter of defense against organized capital and organized labor, between which two millstones the salaried class found itself being crushed.

In many cities the school teachers, for example, have joined the American Federation of Labor. In Washington, the Government employees, including the mining engineers and the geologists, have joined the Federation; and an attempt has, we understand, even been made to organize the ministers. Efforts were also made to draw the farmers into the Federation, in which case the trick would have been turned, and organization would have been able to dominate; but the farmers would have none of it. Yet the farmers have organized among themselves ever more efficiently, in the National Grange and in other organizations, so as to obtain the benefit of class combination as a means for protection, mutual betterment, and power.

In other words, society is organizing into economic and industrial groups, within which is a regular system of sub-groups; and these bid fair to establish, in the future, the balance of power, and by their reactions against the constitutional legislatures, such as Congress, make this more and more the puppet which shall act as the country's invisible and invisibly balanced government by groups shall decide.

It was in the spirit of the times, therefore, that the American Association of Engineers was organized—an Engineers' Union, in effect, although the name is perhaps not sufficiently refined to be pleasing. The amalgamation was needed; and the success has been very great under the presidency of Professor Newell, in that the association has thousands of members.

Great are the services performed by daring innovators. The organizing of the Mining and Metallurgical Society, as a protest against the desuetude of the American Institute of Mining Engineers, resulted in the reform of this latter body. In much the same way, although the American Association was severely criticized as being undignified and unprofessional, the dignified national societies began to listen with respect when they heard of the universal success; and now they are frankly deciding to form a similar organization, and take the business away from the American Association. It is probable that they will get the business, on account of their official dignity and affiliations; but if so, the American Association will have amply justified its existence, and the credit must be given to Professor Newell.

It is really a sensible and necessary thing, as society is developing. Let energetic measures be taken that the engineer may not only have his rights, but may be able to exercise his duties as the man above all others best fitted by training to lead. Let him compete with the lawyers and professional politicians for the guidance of such public affairs as are essentially engineering in their character.

The Sport of Kings

GOOD sportsmanship in any line of endeavor has been applauded since time immemorial, and the breaking of a record, the accomplishment of a task in a shorter time, or the besting of one's rival in a clean, openhanded manner, has always created favorable comment. There is a deep-seated love of conquest in each one of us, a desire to see the best man win, and this applies to our work as well as our play. The same thrill which we experienced when we watched "Willie" Jones outswim his rival at the "old swimming hole" affects us later on when we pat "Bill" Jones on the back for holding the highest batting record, and we derive a similar satisfaction when we learn in later years that W. H. Jones has accomplished some notable success in his chosen field of endeavor. "The world loves a lover," and, similarly, we all admire attainment, particularly when that attainment marks a new record.

With the introduction of power drills, the old-time single- and double-jack drilling contests which were eagerly looked forward to practically passed into the discard, but the same spirit of friendly rivalry still exists between those who follow the game of the "hard rock man." Such rivalry brings out the best in industry; the mutual "love of the game" forms an unconscious bond between employer and employee. Each regards the other in the light of sportsmanship, and a common ground between them is established. The employee becomes his "boss's" champion, and the employer, in turn, looks to his workman to uphold the honor of the "team." A splendid example of this was shown during the war when the shipbuilding program was at its height and many spirited contests were held to determine the supremacy in riveting. Such co-operation between employer and employee, obtained through the medium of a common interest in sport, is also devoid of any objectionable paternalism.

From time to time we have been pleased to mention in our columns the records of attainment in shaft sinking, drifting, or other branches of mining. That these records have been jealously guarded by those who performed them cannot be questioned, but this is indeed a pardonable pride, and we are glad to give credit where credit is due. It is our intention to place before the mining public all the facts that we are able to obtain in regard to the accomplishment of such work, believing that the industry has a taste for "sportsmanship" and is willing that the best man *shall* win.

In our news columns last week appears the announcement of a new shaft-sinking record, obtained by the Van Dyke Copper Co., Miami, Ariz., of 301 ft. in thirty-one days. In this issue we publish the account of tunnel driving in the Lake Superior iron country by the Cleveland-Cliffs Iron Co., during which work a new record—more than 9 ft. of 8 x 8 ft. drift being driven per eight-hour shift—was established in that district. Both of these instances are notable in the annals of mining, but we predict that the "sporting blood" of mining men is such that there is bound to be considerable effort to beat these accomplishments—and the present holders of the titles will do their best to defend their records.

Success in any undertaking is gaged by accomplishment; the progress made is dependent upon the spirit with which the work is done, and the monotony of a task is always removed if the proper impetus, which separates the workman from possible drudgery, is supplied. The induction of the "sportsmanship" idea into industry supplies that impetus.

Platinum or Nickel Money

A DISPATCH from Germany states that the Bolshevist Commission of Finances has published a plan for a currency which will have such a basis as to be acceptable by foreigners, in the expected foreign trade. A new type of credit note will be issued, based on a reserve not of gold but of platinum. The issue will be limited to 65,000,000 rubles in notes of 50, 100, 500, and 5,000 rubles, and will be backed by reserves of platinum to the value of 37,500,000 gold rubles. The government will be ready to convert the notes on call into platinum coin. Those notes will be used for foreign purchases, whether made by the government or by citizens, and will, in any case, be exchanged only for commodities that are of vital importance to the welfare of the people, who are in need of machinery, tools, and metals for agriculture and manufacturing interests, which must be re-established with as little delay as possible.

This program calls for a platinum reserve, at the present prices, of around 125,000 ounces. While it is doubtful whether Russia has that much on hand, it is probable that she can accumulate it, as she is the principal platinum producer of the world. Though she produced only 50,000 oz. of the metal in 1917, 63,900 in 1916, and 124,000 in 1915, her normal production in previous years was between 250,000 and 300,000 ounces.

Platinum coinage has actually been used in Russia before, between the years 1828 and 1845, when the experiment was discontinued.

This report may not be dismissed as altogether improbable, therefore, and, indeed, it is quite natural that, as money is a commodity of exchange of intrinsic value, and easy to handle, a country which has an advantage, in its platinum, over the rest of the world should so employ it. Have we the greater portion of the gold in the world, and do we expect by virtue of it to continue indefinitely as the world's bankers? If England or France were in the position of Mexico, in being great silver producers, doubtless they would use silver as current money wherewith to purchase commodities and sustain their currency; but the United States controls more silver production than England, whereas England controls more gold production than the United States: therefore, this is not likely to happen.

What of the case of nickel, however? Nickel is one of our common coinage metals. The British Empire, that is to say, specifically, the Sudbury district in Canada, produces 85 per cent of the world's nickel, and the reserves of ore are enormous. France, with 11 per cent, possesses most of the rest; the United States has practically none. Suppose that Great Britain would decide to use nickel as a basis for her currency: would it not be natural to use her greatest metallic resource as security and would not that affect the relative banking position of herself and the United States? One of the large Sudbury properties, the British America Nickel Corporation, Ltd., is controlled directly by the British Government.

The great problem of the hour is for the world to give security for its debts as expressed in paper currency notes. If there is not enough gold to offer sufficient security—and there is not—is it not a natural tendency to pledge those other more valuable metals which have long served for coinage purposes, especially in the case of a country which may be short of gold, but rich in some other negotiable and portable metal?

Metalliferous and Also Argentiferous

WE DO NOT advertise mining stocks, but we reproduce with joy and without charge the following advertisement in a recent issue of the *Morning Telegraph* of New York:

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The formation on Chloride Canyon belongs to the miocene and quartinary ages, with pelsoaic intermingled. The prophyry lies on the east and has been wholly undisturbed, while the rhyolite on the west seems to have had some heavy movements. The porphyry is magnifurious, granite porphyry.

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What a simply told yet epic tragedy of monsters in the primeval slime!

We have lately considered the doctrine of spiritualism unproved. We ask thy pardon, O shade of Metalliferous Murphy, whom we feel wrote the above.

Let us pause and recall the famous advice of that early Western pseudomorph after a mining expert, Metalliferous Murphy of Colorado, to the prospector who brought him some ore for his opinion. Sagely he squinted and sagely he spat, and then impressively he spoke:

"This ore, me bye, is highly metalliferous and also argentiferous, its component parts being lead. If ye're a poor man—and judgin' by yer clothes ye are—I advise ye to have nothin' to do with it. Where did ye find it?"

Wise Saws of the Mining Game

ARGUMENT by quoting proverbs is a familiar type of forensic conversation. It is one step removed from the argument by authority. To say as justification for a near-error "A miss is as good as a mile" is a method not far removed from that used in quoting St. Paul as regards the prohibition question—"Use a little wine for thy stomach's sake." Possibly one is as good as the other—the proverb represents popular opinion; the citation, the personal opinion of some prominent individual.

The mining industry is no stranger to both these types of argument. Some of the proverbs have been heard for so many times that in our extreme weariness we confess that we could have been happier had they never been born. "In a true fissure vein, the deeper you go, the richer it gets. The ore will go as deep as man can devise to mine it." Spare us, ye gods! Again, "Gold is where you find it." How many times have you been handed this facer by some cocky individual, as a rebuke for your presumption in inquiring into the laws of the deposition of gold, or profiting by your experience and observation? The proverb is dealt out to close the discussion, and it does—it does. You cannot object to it: it is true; and the only apt comment would be discourteous. You might reply also that "Asses are where you find them," but you would not get forwarder, though the truth of the statement cannot be challenged.

This proverb, we believe, comes from the Book of Job, and reads "Gold is where they *fine* it." The Standard Dictionary explains "fine" as a verb, "To purify from extraneous or impure matter; clarify; refine; as, to *fine* gold; to *fine* wine." Therefore, the gifted author of the Book of Job referred poetically to the fact that gold was won by washing it from dirt and gravel—nothing novel to us, but good information for the uninitiated; and at least not drivel, like the perversion the Cheerful Idiot quotes at you.

Another more modern dictum is that no orebody has ever been found by an engineer or a geologist. According to this law, ore can be found only by a prospector—with sometimes an exception in favor of a farmer, a drunk, or a burro. Some inhibition, apparently, prevents the engineer or geologist from finding ore, even if he stumble over it. Useless, therefore, for him to go prospecting. His training disqualifies him.

To demonstrate the lack of universal application of this law from the standpoint of reason would be tedious and unconvincing. Who wants to be bored by reason? To exhaust the subject by the relation of anecdotes, instances, and statistics, would be interesting, but futile.

At any rate, we may refer to the article in the last issue, describing the discovery of the Mandy mine, in Manitoba, by engineers. In this case, no one but engineers was in the party—nary a camp hand nor burro to serve as an argument for the party taking the opposite side in the debate. Moreover, the vicinity of the find had been well traveled over by prospectors, who had located a claim, as yet unproductive, very close to the Mandy.

We shall be generous to the extent of being honest, and say that the discovery was probably not due to the fact that the discoverers had engineering and geological experience; but the facts are comforting, in that they show that Fool Luck has no grudge against the College Man.

WHAT OTHERS THINK

Tungsten Tariff and National Policy

REFERRING to the hearings on H. R. 4437 before the Committee on Ways and Means, the *Congressional Record* says: "Only one person has appeared against the bill, and he is owner of a Bolivian tungsten deposit." This apparently refers to me, and, if so, there are only two mistakes in the statement; one, I did not appear against the bill, and the other, I do not own a mine in Bolivia. I did, however, advocate and still contend for exemption from duty tungsten concentrates produced by United States citizens in South America, and for what I consider the inalienable rights of these citizens. Such an exemption would not conflict with a duty protecting our home miners and should solve the problem of our excess of consumption above production.

Every economic consideration favors the exemption of South American tungsten concentrates produced by United States citizens from the tariff imposed in this bill. Such exemption, moreover, would be an encouragement to "our returning boys" and to our other citizens to take advantage of the exceptional opportunities for investments in South America. Each one that does so becomes an advocate, supporter, and helper of American trade. A comprehensive American policy should include our citizens abroad as well as at home. Dr. Barrett, director general of the Pan-American Union, announces that our trade with South America "has reached the magnificent total of $1,750,000,000," and it is hoped it will reach two billions of dollars, but if our national policy is to treat our citizens as aliens and outcasts as soon as they pass outside the three-mile limit, it is useless to expect to attain such a sum. Our exports to Bolivia increased from $1,500,000 in 1913 to $5,100,000 in 1918, and there are twelve other states in South America.

From personal experiences I am convinced that one of the most important considerations in relation to the continuance of our present and the increase of our future trade with South America is to establish the confidence and respect of the peoples of these countries by duly recognizing our own citizens there, granting them all the rights, titles, privileges, and protection of home residents, and in return obtaining their invaluable and necessary aid in developing sales of our manufactures and merchandise and the importations of American machinery as an advertisement and medium of trade; not only acquire these advantages, but also to procure for the representatives sent out from the United States to compete for this trade the valuable business information they would be able to furnish.

Allow me to emphasize the fact that these American pioneers, by their use of American goods, are the best and most practicable advertisers possible for American trade; American machinery is shown at work; automobiles, trucks and internal-combustion engines are shown in operation; American clothing, shoes, and foods are ocular demonstrations.

It will probably be admitted that, in a national sense, our pioneers who have helped in the development of other countries that proved gainful to us, and most loyally advocated American interests, have not been very generously treated heretofore. Personal recognition and appreciation is as powerful an incentive in business as in war.

In the hearings before the Ways and Means Committee of the House of Representatives on H. R. 4437, page 29, J. H. Holmes, Jr., Secretary of the Tungsten Products Co., in a supplemental memorandum to his oral testimony, makes sympathetic reference to happy homes and taxes, and states that, under a $10 per unit tariff, foreign tungsten would not be excluded from the United States market.

It is possible that Mr. Holmes had given neither thoughtful consideration nor careful investigation to this subject as far as South America is concerned. Had he done so he would have learned that high-grade, pure Bolivian tungsten concentrates cost as much on the average, if not more, delivered in New York, than our workable concentrates, and that a $10 per unit duty would prohibit the importation of this much-needed kind of tungsten concentrates into the United States from South America, and correspondingly "knock" our export trade.

There is no cheap Bolivian high-grade pure tungsten that I ever heard of, except where it was claimed in an effort to sell a mine. The best information I have been able to obtain gives the cost of production of three of the most successful tungsten mines in Bolivia as averaging from $9.50 to $13 per unit of 60 per cent WO_3 concentrates delivered to railroad at Oruro. A $10 per unit duty, without exemption, of tungsten produced by American citizens would largely, if not entirely, preclude shipments from South America, unless the price should go up to $28 or $30 per unit. The pure, high-grade Bolivian tungsten concentrates, over 65 per cent WO_3, which are mixed with the more impure ores for smelting, cannot on the average be delivered in New York under $16 to $18 per unit.

South American trade, everything considered, is most important, hopeful, and will be permanently beneficial for us. Intelligently sought and successfully obtained, it will promote a true and binding Pan-Americanism. This conviction has made me a persistent advocate of Congressional support to each and every earnest effort to build up indestructible business relations with South America.

It is estimated that, operating at full capacity, 40 per cent of our manufactured products will have to be exported to save congestion at home. It is therefore not surprising that in anticipation of such a situation great organizations are being formed to send out representatives and salesmen to compete especially with Germany and Japan, and it does not require a vivid imagination to realize the consequences of reports coming back that the exclusion of its raw materials from our market has made it impossible to sell our machinery and merchandise in South America.

Raw products are the financial lifeblood of South America. To sell we must buy. With our expanding merchant marine, the imperative need of cargoes for vessels, both going and coming, is apparent and fundamental for profitable operation.

I am favoring a protection for our South American

trade by proposing the release of the tungsten product of our own citizens from the $10 rate of duty imposed by the bill. If South American trade is inconsequential to us, then our contention is reduced solely to Americanism. If, however, this trade is or will be important to us, then my recommendation cannot be successfully controverted, and that is the essence of the whole matter.

It is said that to arrive at a just and reasonable conclusion on any question under discussion it is necessary for adjudicators and advocates to start from some mutually accepted premises, and I propose the following as a basis of such agreement:

1. That our manufacturers, merchants, and producers have determined to earnestly seek South American trade.
2. That provable, reputable, responsible, and loyal citizens of the United States in South America are as much American citizens as citizens within the boundaries of the United States.
3. That tungsten concentrates of high grade and purity, produced by American citizens in South America, as a matter of fact, are not in competition with our home product, but are a much-needed supplement, and cost substantially as much delivered to the consumer.
4. That we need the product of our merchantably workable tungsten mines.
5. That we certainly need the South American high-grade and pure tungsten concentrates, not only to meet in part our normal consumption, but also to mix with our low-grade concentrates, and to get the best tool steel; in addition, to prevent Europe from having a manufacturing advantage over us by obtaining control of the best South American tungsten mines.

Admitting these facts—and I do not think they can be successfully refuted—will not the following suggestions meet the requirements?

(a) Grant an adequate duty per unit for the protection of Western tungsten miners.

(b) Grant an exemption from these rates of duty in some such form as the following: Provided, that the rates of duty contained in this act will not apply to any enterprise or enterprises for the mining and treatment of tungsten in South America and other countries where properties are owned, or leased, or controlled and operated by a bona fide citizen or bona fide citizens of the United States, operating and shipping prior to Dec. 1, 1918, when such ores or concentrates are being imported from South America and otherwhere abroad into the United States of America;

Provided, further, that the Federal Trade Commission be and is hereby authorized to determine whether or not any such enterprise or enterprises are in fact owned, or leased, or controlled and operated by a bona fide citizen or bona fide citizens of the United States of America, with appeal lying to the Circuit Court of Appeals.

For considerable time, no doubt, Europe will make a great demand upon the United States for raw materials and manufactured articles, but for uninterrupted export trade, and to supplement our supply of raw materials, South America is the most hopeful permanent market, and its people have the money now to pay for what they buy. They do not have to wait for a profit on manufactured goods.

The discussion before the Ways and Means Committee as to depletion of mines was interesting. The conservative judgments as to such a possibility under forced draft, expressed by George Otis Smith and Frank L. Hess, of the United States Geological Survey, contrasted strongly with the optimistic opinions of George H. Bailey, of the American Mining Congress, as he depicted the prospector. Unfortunately, so many hundred millions of dollars have been lost in mining—from coal to gold—that the enthusiasm of the prospector is not convincingly accepted by either the expert or the public. The uncertainty and indefiniteness of tungsten deposits make estimates of quantity largely conjecture, and conjecture is not a safe basis of calculation in case of need or war. From the experiences of the past, the "next war" will increase the demand for tungsten, with our present domestic supply decreasing in quantity.

Tungsten ores are easily recognized, and deposits in our country that were not discovered by the ubiquitous prospector, under the stimulus of a $60 to $90 unit price, can safely be assumed to be amazingly secreted. The too rapid depletion of our tungsten deposits is not a question that should concern us for a decade only, but for a century. All ore extraction is depletion, and there is no such thing as replacement. When ore is taken out, it is gone forever.

If tungsten deposits were as abundant and as dependable as iron ores, tungsten ores would sell at the same prices. I favor such rates of duty as may be required to admit of the profitable operation of merchantably workable tungsten deposits in our own country. I desire to emphasize *merchantably workable*, because, as is recognized in all mining propositions, there are deposits that cannot be worked until many other more cheaply producing mines are exhausted. A mine that cannot produce tungsten profitably at less than $20 per unit is not a merchantable proposition at this time. A too-extended or too-generous protection would make the easily worked mines bonanzas, and yet not to impose sufficient duty to enable some of the more costly mines to be worked would be equally objectionable.

The important point is, as I see it, that "foreign importations which are more cheaply produced than we can produce them here" are the only ones to be subjected to the $10 per unit. This at once exempts South American high-grade tungsten concentrates from the application of the act, *for this South American tungsten is not more cheaply produced than here*, and for the following reasons:

1. The mining is "deep mining"; timber is required for supports and buildings, and imported mostly from the United States and costs $175 per thousand feet.
2. On the basis of individual wages and individual productivity, unskilled labor, which consists of the nomadic Indian, when it is possible to get him, at the equivalent of $1.25 to $2 gold per day (one American workman is equivalent to three Indians) is higher in Bolivia than in our own mines, and skilled labor and salaries are much higher.
3. At an altitude of 13,000 ft. or more the reduction in efficiency of internal-combustion engines and air compressors is at least 40 per cent; the cost of fuel is also very high (inferior coal $100 per ton, gasoline $1 per gallon) and other operating expenses in proportion.
4. Transportation costs from mine to railroad and over 600 miles of Andean railroad—from Oruro, Bolivia, to Mollendo, Peru, the principal port of shipment—are three to four times as great as in the United States. An export duty and losses through exchange are not small items. There are also port charges, loading by lighter, ocean freight, insurance, unloading at New York, storage and brokerage fees.

It does not appear to me to be the part of financial or material wisdom to legislate ourselves into a position where the price of tungsten in the "next war" will again go to $75 or $90 per unit and then obtain only half our needs, until South America, again responding to our appeals, helps us out, that is, again helps us out, provided its best tungsten supply has not been pre-empted by European customers.

The retroactive assessment, in H. R. 4437, on South American tungsten concentrates in domestic storage, if

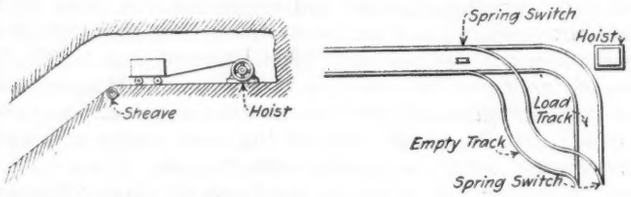
not unconstitutional, is certainly a penalty placed, in some cases, upon those who pushed the output of their mines to the limit in order to aid us in our time of need.

Philadelphia, Pa., March 3, 1920. R. H. HEPBURN.

[Prepared for presentation before the Senate Committee on Finance, but, owing to lack of information on the time of meeting of the sub-committee, it was not formally presented, and copies were sent to a number of Senators on the committee. The original report is condensed.—EDITOR.]

Underground Hoisting Arrangement

In going through my files of the *Engineering and Mining Journal*, I came across the article "Underground Hoisting Arrangement," which appeared in the issue of April 26, 1913. Why such a complicated arrangement for a shaft inclined as shown? Apparently the dip is about 45 deg. The skip shown is of much the same construction as a mine car. Why not merely pull a mine car over a "knuckle" and tram it around to the main shaft, such as is done in slope coal mines, thereby elimi-



SIMPLE UNDERGROUND HOISTING ARRANGEMENT

nating the transfer of the ore as an operating saving, in addition to the large saving in installation? I have indicated the method in an accompanying sketch, which shows an empty track for the storage of one or two empties. If the operation is not too fast, the hoistman can do the coupling and uncoupling of the cars and after dropping an empty back for the muckers, tram the load around to the main shaft dump, provided the latter is not far away. M. L. O'NEALE.

Gouverneur, N. Y., Feb. 16, 1920.

Wood as a Metallurgical Fuel

In answer to a query by E. M. Weston, of Johannesburg, which appeared in the *Engineering and Mining Journal* under date of Feb. 28, regarding the use of wood in heating small or large reverberatory furnaces, I may say that about twenty years ago, when I was a student at the Thames School of Mines, in New Zealand, satisfactory results were obtained through using wood as fuel in the small reverberatory furnace which we used for the chloridizing roasting of silver ores and for oxidizing roasts of sulphide ores in the experimental plant attached to the school. The wood used was a hard native wood, called "Rata," which gave a very hot and lasting fire. Since that time, I have not seen wood used in reverberatory furnaces. The capacity of our small furnace was about one ton, the hearth being, to the best of my recollection, approximately 6 x 8 ft. It seems to me the greatest difficulty with wood fuel would be the necessity of frequent charging.

I am not able to answer Mr. Weston's second question, as I have no experience along these lines.

Denver, Col., March 4, 1920. ROBERT CLARK.

Magnesite Tariff Bill

I have read with amusement the communication signed by F. F. Colcord, in your issue of Feb. 7. One would get the impression from Mr. Colcord's article that there was no other magnesite produced except that produced by the Northwest Magnesite Co.

It happens that I am personally interested in four separate and distinct magnesite properties in California which are struggling for an existence at the present time, and possibly Mr. Colcord has never been in California and has no knowledge of any other magnesite except that produced in Washington; as I note he was interested enough to oppose the tariff by appearing personally in Washington on Jan. 13, 1920, to testify adversely before the Commission on Magnesite. The fact that he is interested might account for his overlooking California entirely, as I will admit we are only the second largest state in the Union.

It would be pleasing to have you print the fact that there are a great many miners in California whose living at the present time is dependent upon the magnesite industry, and thousands of residents of the State of California are deriving benefit from this industry; and, as I said before, it is amusing to read Mr. Colcord's article and to notice his purposeful or unknowing ignorance of California as an important source of magnesite production.

It has been my pleasure to read some editorials in *Engineering and Mining Journal* in favor of the tariff to protect this industry, and I am sure a thorough investigation of the industry will disclose the fact that such support is justified. C. S. MALTBY.

San Francisco, Cal., March 2, 1920.

Reasons Why We Should Make Hoover President

Because he is American through and through.

Because he stands for a league of nations sanely adjusted to accord with our principles of government, and as tending to prevent war and help in the return of confidence and economic reconstruction.

Because he is a master of economics, and the present problems and future prosperity of our country and the continued progress of mankind in general depend upon correct solution of economic problems.

Because he believes that socialism has proved itself a dangerous delusion and failure, holding out false hopes of happiness that can only come as the reward of earnest individual effort under equality of opportunity to accomplish what is within the capabilities of each.

Because he believes that progress in a democracy can come only through the free efforts of the individual and that only by such free efforts can there be maximum production and therefore minimum cost.

Because he believes in the necessity of organization to carry out political action and has shown himself a master organizer and a statesman.

Because, finally, he is honest, brave, humane and able, and his platform in its ultimate analysis means fairness and equality of opportunity to all, and because he has demonstrated his ability to succeed in whatever he undertakes to do. W. F. STAUNTON,

Los Angeles, Cal., Feb. 29, 1920.

By The Way

A Creek Philanthropist

Jackson Barnett, of Henryetta, Okla., a Creek Indian who was made wealthy by the forcible allotment of land in what is now the Cushing oil field, has given a large sum, said to be a million dollars, for the erection of a hospital at Henryetta for the benefit of sick Indians of the state. Like many another who has attained sudden affluence in the petroleum fields (we have made no money in oil), Barnett is said to be a prize incompetent. The idea of the hospital originated with the Indian Commissioner at Washington, it happening that Barnett wanted to spend his money.

In Costa Rica

A pronounced labor shortage exists in the mining districts of Costa Rica, following the recent revolution, according to our correspondent. Increased agricultural activity had much to do with this. An exodus of negro labor to the West Indies and of foreign miners to other Central American countries also played its part. Then again the dictator's troops returned sick with dysentery and malaria, and will be unfit for production of any sort for some time. The revolutionary troops, on the other hand, hold that a patriot who has risked his life should not have to work—so they don't work.

Moonshine

"The production of gold and silver through a mechanical duplication of nature's process," says a Louisville, Ky., newspaper, "was the result of experiments covering a period of eighteen years. . . , and documents were produced showing that at least one eminent chemist has made gold from the formula of the discoverer." Should not this have read 1,800 years? If true, what money standard will we adopt, and, further, how will it affect the complicated financial and economic condition of the world? But there is a grain of comfort in the fact that although prohibition is in operation, this report *did* originate in Louisville.

Southern Gold

"Gold is so plentiful in Montgomery County that prospectors do not have to go out into the mountains to reap a rich harvest," says the *Piedmont Herald*, of Troy, N. C. "Some time ago Sheriff Stuart captured a 200-gal. still down near Candor. It was made from copper plates found around the gold mines. The still was actually gold plated. Reid Stafford concluded that the gold was going to waste there, so he asked permission of the sheriff to remove the same. With a steel scraper he commenced operations. After removing the gold he reduced it in a crucible, and he now has a button of gold worth about $20."

Altitudes and Temperatures

News of the recent exploit of Major R. W. Schroeder at Dayton, Ohio, in reaching the height of 36,020 ft. in his plane and thereby besting the world's altitude record by about 5,000 ft., was read with great interest, and his experiences add to the notable accomplishments which have already been attained in the field of aviation. The following descriptive paragraph appearing in the *Times* of a recent issue is of particular interest:

> Major Schroeder was dressed heavier than any Polar explorer. He was literally wrapped in flexible electric heaters. His flying-suit was lined with the fur of Chinese Nuchwang dogs, and between the fur and the outer lining flexible electric heat units, connected by silk-covered wires with the dynamo of the engine, heated the entire suit. In like manner his headgear, gloves and moccasins were heated. He wore an oxygen mask of his own design.

This mode of dress is suggested for the careful consideration of Mesabi-Range engineers and others, whose work during the winter months necessitates the "numb-thumbing" labor of man-handling a transit when the weather is below zero.

Ten-Cent Cigars and Mining Leases

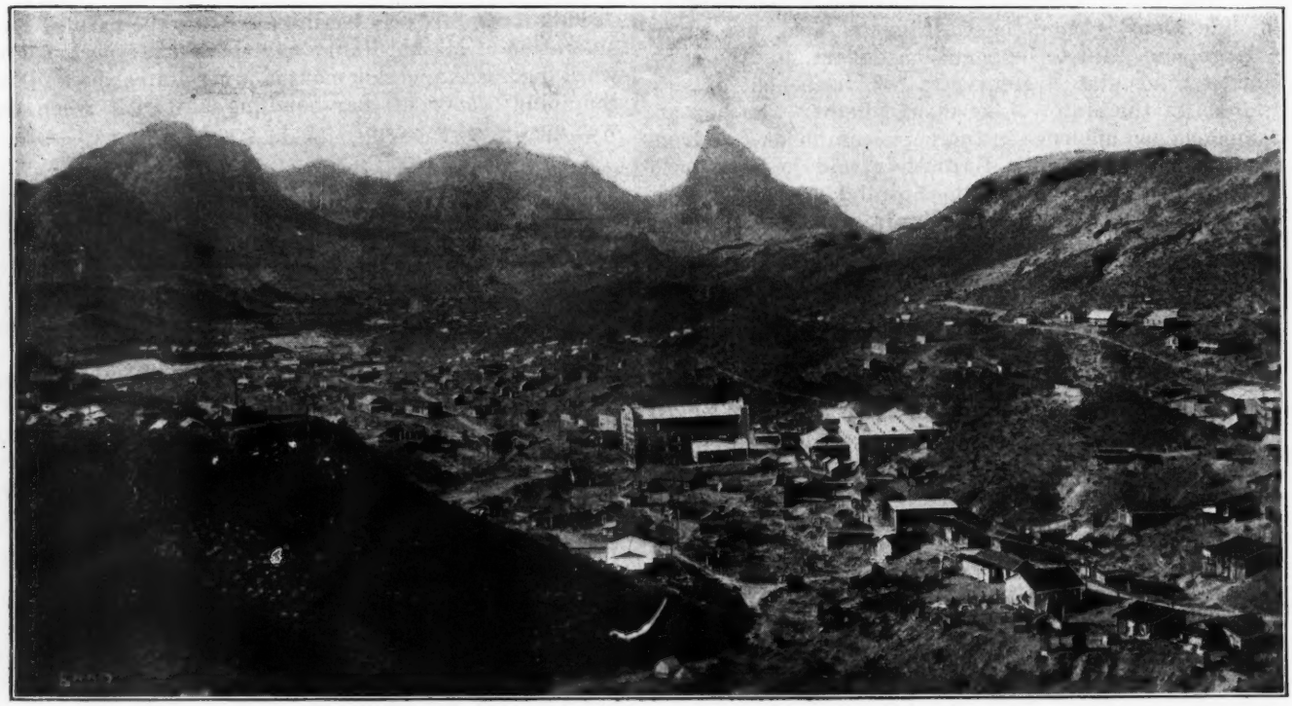
Out in Kansas, where so many strange things happen, a partnership, or joint venture in farm leases, hay, grain, and insurance, became disrupted when it finally engaged in mining. This unpretentious partnership, composed of Apple and Smith, took mining leases upon lands in Kansas and Oklahoma for the purpose of prospecting, mining, subleasing, and developing them. When bonanzas developed Smith denied the partnership in the mining venture, and Apple sued for an accounting. Smith alleged that all mining leases, except a small one in Oklahoma, belonged to himself and that Apple had no interest in them. There was no formal written agreement.

Upon trial of the case the court for Cherokee County found that the parties had united in a joint venture in a considerable number of mining leases, some of which had developed into very valuable properties. An accounting was also made between the parties, and a judgment of $55,042.03 rendered against Smith, the partnership dissolved, and it was decreed that a receiver be appointed to collect royalties, sell the partnership property, and distribute the proceeds. From this Smith appealed to the Supreme Court of Kansas, contending that the evidence did not warrant the finding of a partnership in mining leases.

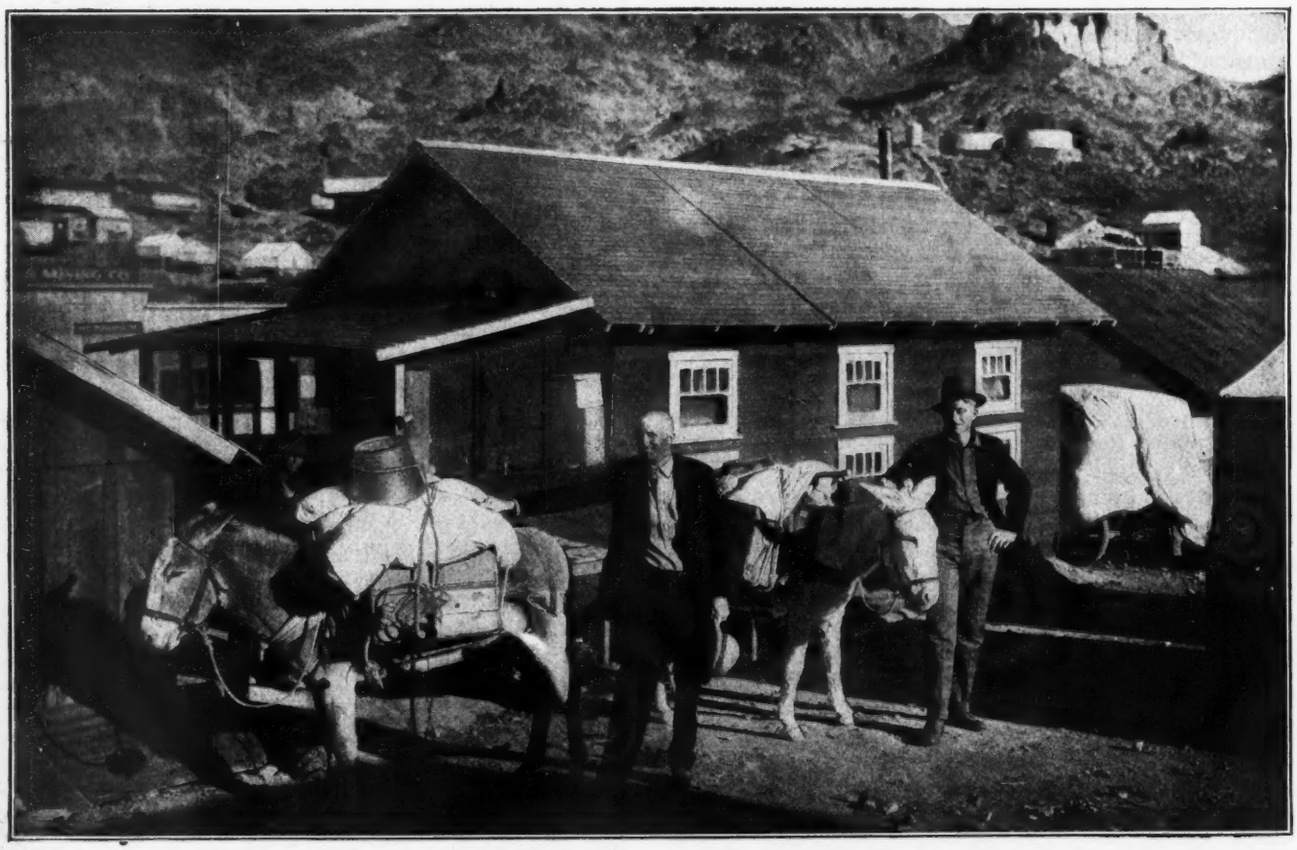
A large volume of testimony was taken, an abstract of which covers 774 pages. This shows that the partners began taking assignments of royalties on Indian lands that had been leased for mining purposes, some in the name of Apple and others in the name of Smith. Next they began to take mining leases in the name of either one or both. The Fish and Douthat leases, obtained not long before this action was begun, proved very valuable, and the claim for a division of the proceeds of these produced the controversy.

The lower court found that though there was no definite, formal agreement of partnership shown, such a relation was established by correspondence, conversations, and the acts and conduct of the parties. The Supreme Court found testimony of admissions by Smith which expressly recognized the existence of a partnership in the mines. Among many such admissions, Smith said to one witness in Apple's presence "Maybe I and Walt (Apple) won't have to hay always if our mines prove to be good on the Douthat and Fish lands. We can sit around and smoke ten-cent cigars." The judgment for Apple was affirmed. As none of the leases involved lands in Oklahoma, it was contended that the court was without jurisdiction. The court held, however, that it could treat real estate belonging to partners as personal property in making settlements of partnership affairs.

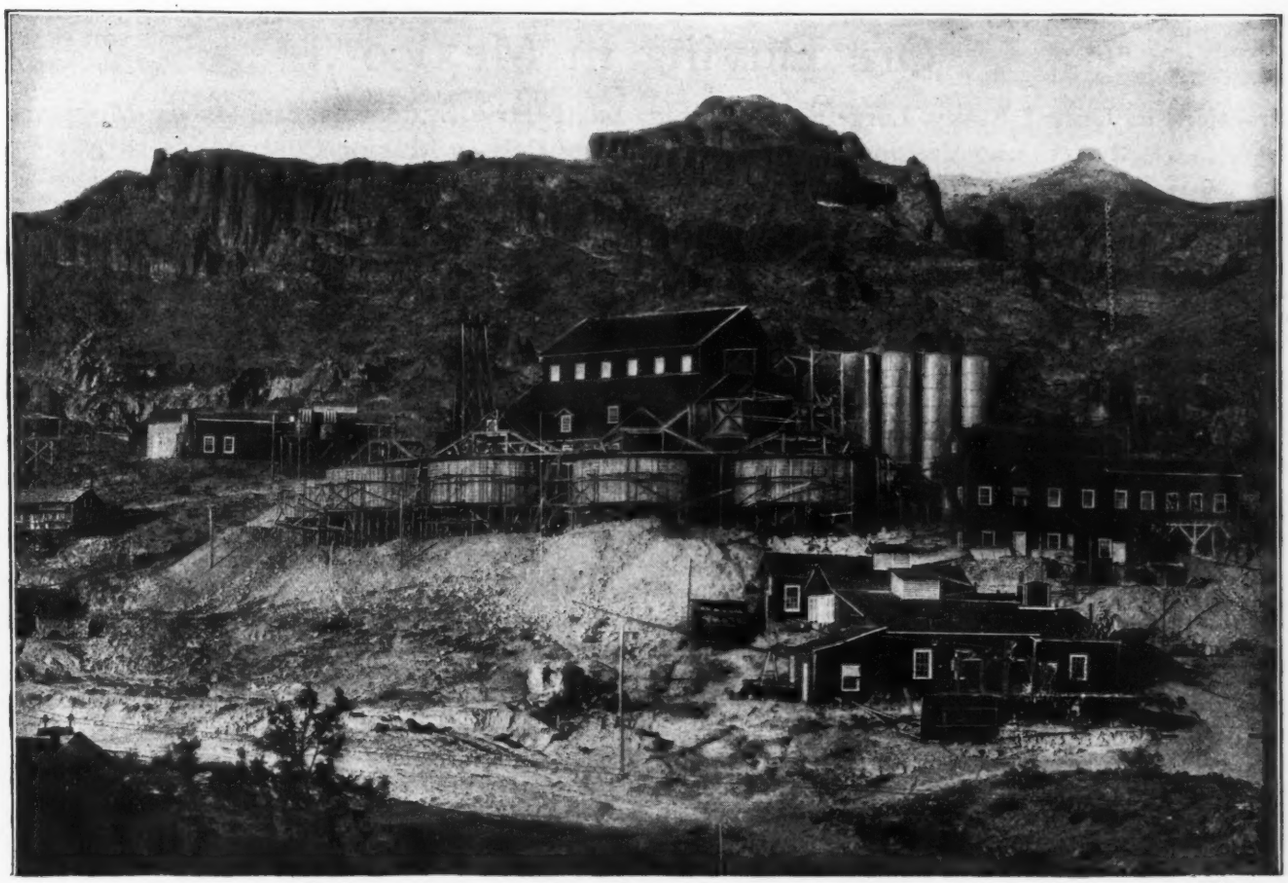
Photographs From Oatman, Ariz.



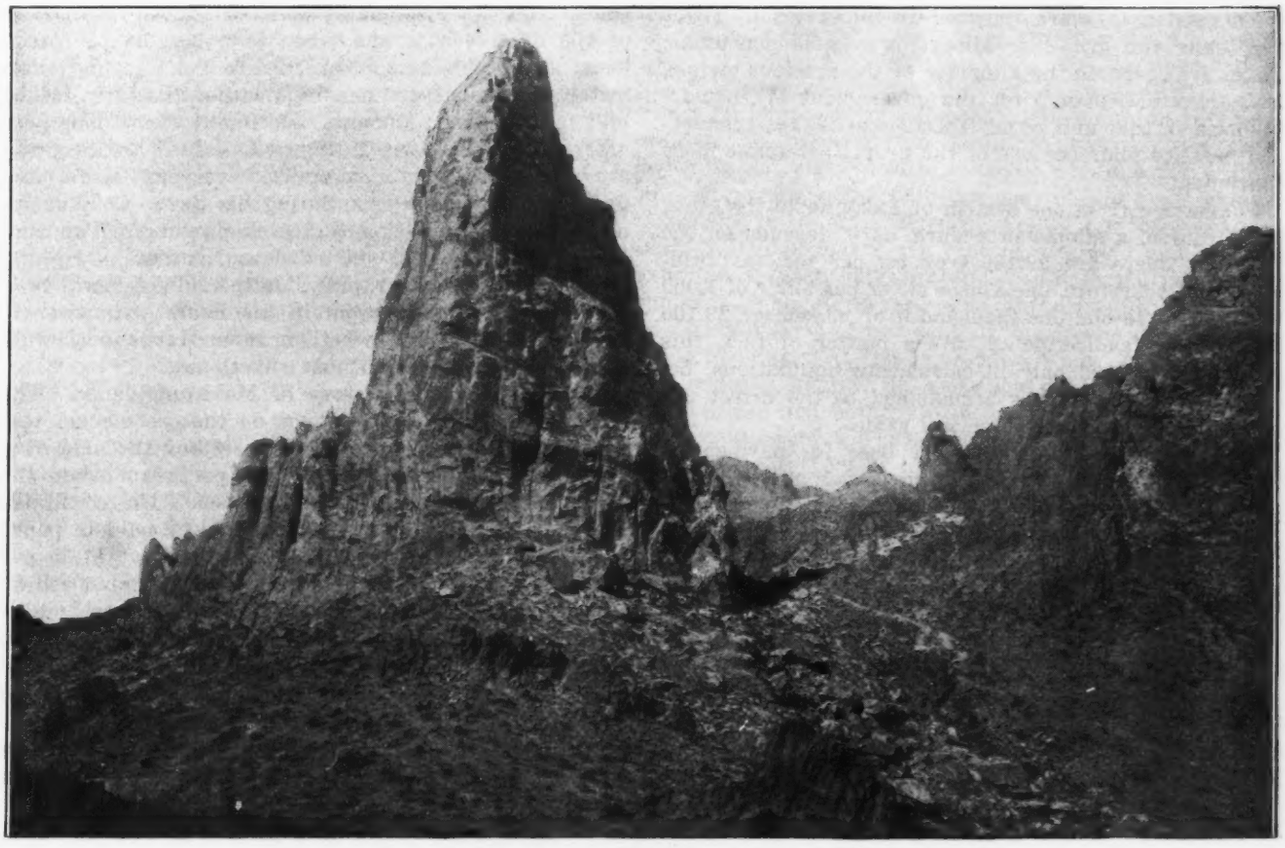
GENERAL VIEW OF THE TOWN OF OATMAN, ARIZ.



PROSPECTORS READY TO "HIT THE TRAIL" AT OATMAN



PLANT OF THE TOM REED GOLD MINING CO., OATMAN, ARIZ.



THE ELEPHANT'S TOOTH, A LANDMARK OF THE OATMAN DISTRICT

Ore Buying in Mexico

Practices in United States Largely Duplicated, but Metric System Is Employed—Monetary System and Varying Exchange Necessitate Care in Making Contracts—Taxes and Freight Rates—Ore-Buying Agencies

BY C. A. GRABILL
Written exclusively for *Engineering and Mining Journal*

GOVERNMENTAL, railroad, financial, and economic conditions in Mexico have been in such a chaotic condition during the last few years that making any detailed statement of this subject is much like describing the pictures at a movie, and what is true at the time of writing may not be so by the time an article is published.

In general, it may be said that the methods of purchase vary little from those customary in the United States, and this is naturally so because, of the important smelting plants in Mexico named subsequently, five are controlled by the American Smelting & Refining Co., and five others by the Cia. de Minerales y Metales, or, rather, by the American Metal Co., and American ways have prevailed to the almost complete suppression of old customs, the only trace of them being the occasional use of the term "marcos por carga" by an occasional old-timer, and a few weights forgotten in some old warehouse.

What has been said elsewhere as to the general methods and conditions of payments, deductions, treatment, charges and other details is just as true of Mexico as it is of the United States, but the units of measurement are different. In Mexico the metric system is compulsory, ores are bought and sold by the metric tonne, and assays are reported in kilograms of silver per tonne and grams or kilograms of gold per tonne. Taxes are based on the kilogram of the precious metals, and, therefore, assays for the government are usually reported in that unit or in fractions of it, but commercial practice finds the use of the grams per tonne more convenient.

Conversion from one system of assaying to the other is, of course, a simple procedure, as it depends on the fact that there are 29,166 troy oz. per ton (avoirdupois) and, therefore, one kilo of silver per tonne of 1,000 kilos would be one one-thousandth of 29,166, or 29.166 oz. per ton (avoirdupois.) As a matter of fact, this conversion is used only in calculating liquidations, because one soon becomes accustomed to the direct use of the figures and their practical value.

The question of the monetary base for payment is important. Before the revolution it was generally the custom to fix all payments and charges in Mexican currency. The results were more than startling when the "explosion" occurred; so a little review of what happened will not be out of place, because of its bearing on the future.

PRICES BASED ON NEW YORK QUOTATIONS

Prices for silver, copper, and lead were almost always based on New York quotations, although lead was sometimes based on the London price for soft Spanish lead, and traces of this practice still remain. These prices were necessarily in United States currency and had to be converted into Mexican currency before making the liquidation in contracts on that standard.

The basis of the Mexican monetary system was and is the peso of 75 centigrams of pure gold (11.57421 grains), and consequently a kilogram of gold was worth 1,333.33, which was the price, less a suitable deduction for refining, that was commonly paid for it in ore purchases. The value of this peso is 49.846c. United States currency, and exchange as it was then quoted was around 2.006. The prices were converted at the bankers' rate on the date of settlement, although sometimes a flat rate of 2 to 1 was prescribed by the contract, which then gave the buyer a slight advantage, say, 0.3 per cent. Treatment charges, payments for iron and lime, penalties for silica, zinc, arsenic, and similar items were stated in Mexican currency. This was satisfactory under normal conditions, but when the revolution came the trouble began.

Gold was the basis of the Mexican monetary system, but there was little of it in circulation, and the requirements of business were satisfied by the use of silver pesos and fractional currency and by bills issued by the various state and other authorized banks. The system was satisfactory and stable, and as far as practical considerations go was about the same as in the United States.

However, the revolutionary party issued bills, sometimes from its own plates and sometimes from those of the other party, and when in power levied forced loans from the banks, practically confiscating their metal reserves; issued new bills without backing, issued bills in unspecified amounts, and finally every little general who could get a printing press issued his own, and everyone refused to recognize everyone else's and finally wound up by repudiating his own. Coin disappeared from circulation, and exchange started up, and the value of the peso started down at first slowly and then more and more rapidly, until finally I heard of a man who papered a room in his house with twenty-dollar bills, although whether as an economical wallpaper or as curios deponent sayeth not.[1]

But this is not a history of Mexican finance. The effect of the unstable currency on the ore market was bad and a little mixed. A contract for the sale of a gold ore, gold being paid at 1.20 per gram when the value of the peso had dwindled to 5c., United States currency, meant that the seller would be paid in paper pesos and that he would receive only about $1.65 per oz. for his product. On the other hand, a man selling copper ore would have the price of his copper multiplied by the exchange rate and obtain its full value, and would pay his treatment charge in the depreciated paper, and if it was, say, 10 pesos per ton, it would cost him only 50c. United States currency. This mass of paper was at the time, it must be understood, legal tender, at least within the jurisdiction of the issuing party.

[1]Mexican currency is now on a metal basis, and there is no paper currency.—EDITOR.

These are, of course, extreme cases, and it is doubtful if any ore ever changed hands except in isolated instances on such terms, but the effect was the same, in kind if not in amount, from the moment that the peso began to depreciate in value, and that condition did obtain for considerable time. Of course such a condition could not exist indefinitely, and the first step was to put all the terms of the contracts into United States currency, and after calculating the final balance convert that into Mexican currency at the current rate of exchange. This system was in effect only a short time. With an uncertain currency, reserves liable to forced loans, the so-called "interventions," and other troubles, the banks would not accept checking accounts. Transportation of money was unsafe and expensive, so the final result was that the balance referred to before was given to the shipper in the form of a New York draft, which he could sell in the open market for what it would bring. Small shippers at agencies and like places were sometimes paid in cash.

Embargoes Placed on Exports of Gold and Silver

Finally, the paper currency had depreciated to the point where it had no value at all, and the government returned to specie. To do this an embargo was placed on the export of gold and silver as metal. All shippers of gold in ore or bullion were compelled to import an equal amount of gold, all exporters of silver had to import gold to the extent of 25 per cent of the value of the silver. This naturally would be coined and put into circulation. The United States had placed an embargo on the export of gold as a war measure, and the result would have been a shut-down of the industry if one or the other had not yielded. The United States did so to the extent required. The United States Government also placed an embargo on the export of certain materials and restricted the export of others. The result was that the metallic currency of Mexico had an artificial value that was more or less independent of its value in the United States.

The amount of New York drafts on the market, resulting from the sale of ore to the smelters and from the henequen, sisal, and sugar industry, was greater than could be absorbed, and the value of the dollar dropped and that of the peso rose (in terms of dollars in New York drafts) from 49.846c. to 65c. The shipper of ore usually found that the local market was very poor for these drafts, and had to sell them at a discount even from the Mexico City rate. Of course, the bigger companies which imported supplies from the United States could use part of them for payment there, but for that part of their proceeds which they spent in Mexico (this applies to both American and Mexican companies), they were unable to realize the full gold value of their product.

As an example of how this operated, take the case of a shipper of copper ore which yielded $1,000 in the United States. With exchange at mint parity, or, roughly, 2 to 1, this would yield 2,000 pesos in Mexico, and I will assume that $1,000 was disposed of in the following manner:

		Mexican Currency
American supplies	$200	....
Mexican labor	400	800
Mexican expense	200	400
Profit	200	....
Total	$1,000	....

Under the conditions just described, and with the Mexican peso at 65c., the shipper would be able to pay for his American supplies with a draft for $200 and then sell his New York draft for $800 in the open market at 65c., obtaining 1,230.77 pesos. He would pay his Mexican expenses, amounting to 1,200 pesos, and instead of $200 profit would have left only 30.77 pesos.

On the other hand, if, instead of copper ore, the shipment consisted of gold ore, the shipper, or rather the exporter, would have to import the $1,000. He would then have gold dollars, which would pass as 2,000 pesos. He could pay his 1,200 pesos Mexican expense, and with the 800 left buy New York drafts at 65c. and obtain a draft for $520. With this he could pay his $200 American expense and have $320 profit instead of $200. Unfortunately for the Mexican mining industry, the gold production of Mexico is small.

The case with silver ores varied. Sometimes no gold could be imported, and at other times 25 per cent of the value. At this writing the United States Government has removed the embargo on gold exports, and Mexico exchange is approximately normal.

The producer who sold his gold ore locally for drafts at mint parity lost the advantage of the importation of the gold, but it is to be noted that if exchange goes the other way conditions will reverse. At present, with the United States export embargo lifted, gold can be imported into Mexico in unlimited amounts, so that a man with a gold draft can buy gold in the United States and import it into Mexico if the rise of the Mexican peso above parity is greater than the expense of importation. If the peso drops below par, the government will probably remove its embargo also.

With the uncertain state of Mexican affairs analogous conditions are likely to arise at any time, and should be carefully guarded against in all ore-buying and ore-selling agreements as far as possible.

Taxes in Mexico

Mexico is several years ahead of Washington in government by proclamation, and the present taxes are levied in accordance with a decree of June 29, 1919. This prescribes a tax of 8 per cent of the gross value of all gold or silver exported in ores or any form except that of bullion and 7 per cent on the gold and silver exported as base bullion or presented to the mint for coinage. The states are also authorized to levy an additional tax of 2 per cent of the gross value as an extraction tax. At the same time a tax of 1 per cent was imposed on zinc, tin, and some other metals; 3 per cent on lead and nothing to 6 per cent on copper, with authorization to the states to levy an additional tax equal to 50 per cent of the federal tax up to 2 per cent of the gross value. The federal tax is really a production tax, but is levied in the form of an export tax and coinage tax.

The state tax is collected through the local tax collector's offices directly as an extraction tax from the producer, but, to enforce payment, everyone who comes in contact with the ore is made responsible and liable for the tax payment if it has not been paid by the producer. Inasmuch as the amount of the tax depends on the value, and as this is not accurately ascertained until the ore is sampled, assayed, and sold, the practical result is to make the smelters and ore buyers collectors for the tax, and they, in turn, pay it directly into government offices.

This system worked well until the government made the compensation of the district tax collectors dependent on their district collections, and then the natural result was that the miners were not permitted to ship their ore out of the local district until the taxes had been paid, but, as the taxes were dependent on the smelter returns, neither the shipper nor the collector knew what they should be. This resulted in considerable confusion, but the shipper would make a guess at it, or put up a bond, and take a duplicate receipt, presenting one to the buyer. Large regular shippers were able to arrange matters without much difficulty, as their affairs were systematized.

On the first of every month the Treasury Department issues a table of the prices of the metals which are to be used in computing the tax during the succeeding month. Gold is, of course, at a fixed price of 1,333.33 pesos per kilogram; the other metals are calculated from the market price during the preceding month. The states, however, sometimes use an arbitrary value for copper and lead, which remains fixed for an extended period.

The Mexican law also requires that the seller give the buyer a duly stamped invoice, or *factura*, for every lot sold, default of which renders both parties liable to a heavy fine. Occasional shippers, not regularly in the business, may make this out on a loose sheet of paper, but merchants or regular shippers must have a bound book of forms with stubs which must bear their part (the talon) or stub of the stamp. Buyers are equally liable with the sellers for non-observance.

Freight rates are based on metric tons per kilometer, in accordance with tables issued by the government. The rate is also dependent on classification, as in the United States, the classes being determined by the net value of the ore. As this is usually dependent on smelter returns, the smelting companies are used as collecting agencies, not nominally but in reality, and their books are inspected by government agents to verify the correctness of the classifications.

To encourage shipments, large shippers may occasionally obtain special rates, not as individuals, but on open tariffs which any one can use, but at present the rolling stock of the Mexican railroads is pitifully inadequate and in bad condition, and is a small fraction of the amount needed. As a consequence, only in a few cases are reductions obtainable. Large companies are furnishing their own trains, and private companies have been organized to do this for others unable to afford their own. These operators pay the government trackage rights, and collect accordingly.

It is to be hoped that this is only a temporary condition of affairs, but it has already lasted several years and does not seem to improve. Every general in the Mexican army appears to be, ipso facto or ipse dixit, entitled to a train when he desires to travel, and as there are more generals than trains, the result is rather discouraging to the small shipper. Of course, with this state of affairs many shippers offer "gratificaciones" to the railroad employees to obtain preference in getting cars, and in crop season these are said to run pretty high. Ore shippers can usually get the big ore buyers to furnish cars for them.

Shipping to the railroad is done by almost all means, except camels and elephants. Industrial railroads, autotrucks, wagons with six-, eight-, twelve-, and sixteen-mule teams, ox carts, six-mule two-wheel carts, mules and burros are all used, but, owing to the depredations of the revolution and the high price of corn, there is a scarcity of livestock, and the number of horses, mules, and burros has dwindled so that if conditions permitted a complete resumption of business there would not be enough animals to do the work. Wagon or cart haulage is cheaper than auto truck, owing to the bad roads and consequent high repair bills of the latter, but the trucks are becoming a necessity, on account of the lack of animals.

Formerly there were a number of ore-buying agencies scattered through the principal mining districts of Mexico, but competition has become sharp, and few are left. Some of these were outposts for the smelting companies and others were independent concerns. The latter bought small lots and combined them into carload shipments or lots with undesirable constituents, and mixed them to dilute or neutralize their bad properties, making their money by the economies accomplished or the better rates obtainable after the mixing, or else by shrewd bargaining, or sometimes as commission for working up trade. Their place has been partly taken by the ore buyer of the large concerns, but these also are limited in number, and their duties are largely those of an intelligence department to keep the concern's office informed of current affairs and in touch with shippers, both actual and prospective.

Owing to the demoralization of the railroads, a number of small local buyers have appeared who will buy anything from a pound up and combine into carloads for shipment. These are often genuine, but are generally regarded, and justly so, with suspicion, as being the means of disposal of considerable stolen ore. The result is that the small peon miner is not able to dispose of his ore to advantage.

Fairly high-grade lead and silver ores of this character are sometimes handled by smelting in small adobe furnaces, the lead obtained being then cupelled. The silver is sold and the litharge used for glazing pottery. The furnaces were formerly numerous, but had practically disappeared until present conditions revived them. I believe that greater practical use might be made of them. Custom milling has not developed into a recognized branch of the industry.

Although Mexico is the natural home of the small smelter, development has been along the lines of consolidation rather than in the establishment of new plants, and there are a number of small plants scattered up and down the Sierra Madres and now idle, abandoned, or dismantled. In large measure, this is due to the cheaper operating cost of large units. The principal smelting plants in Mexico are as follows:

The American Smelting and Refining Co.
- Chihuahua, Chihuahua
- Monterrey, Nuevo Leone
- Velardena, Durango
- Matehuala, San Luis Polosi
- Aguas Calientes, Aguas Calientes

Cia. de Minerales y Metales
- Mapimi, Durango
- Torreon, Coahuila
- Monterrey, Nuevo Leone
- Guadalupe
- Cerralvo

The Greene Cananea Copper Co., Cananea, Sonora
Democrata Cananea Sonora Co., Cananea, Sonora
Mazapil Copper Co.
- Concepcion del Oro, Zacatecas
- Saltillo

The Teziutlan Copper Mining & Smelting Co. Teziutlan, Pueto de Petlacalo
Cia. Metalurgica Mexicana, San Luis Potosi, San Luis Potosi
Cie. du Boleo, Santa Rosalia, Baja California

Reference to the map will show the location of these smelters and bring out several interesting points. Baja

California has only one smelter, and that does little or no custom work, primarily because of the lack of development of the mining industry in the territory, and secondarily because of local conditions. Sonora is cut off from the rest of Mexico by the Sierra Madres, which form an almost impassable wall along its eastern boundary. This is a very rich state, but owing to unsettled conditions and lack of transportation it is still undeveloped. Producers of copper ores are dependent on the two smelters at Cananea or the two at Douglas, Ariz., just across the border. The first two are served by the Southern Pacific and the latter by the Nacozari railway. There are several small plants in the southeastern part of the state, but the country is still too much disturbed to permit of their operation. Producers of lead ore have the choice of shipping to El Paso, via Nogales or Douglas, or to San Francisco via Guaymas.

The west coast of Mexico has no custom smelting plants. Those wishing to ship must either send their ore to the United States by the Southern Pacific or to San Francisco, Tacoma, British Columbia, or Europe by water. This has not been as great a hardship as might be expected, because, in normal times, water freight was cheap, and even now freight from as far south as Chile to San Francisco is only $15 per ton. On the other hand, a plant operating on the west coast would have fairly high costs, owing to the difficulty of getting cheap fuel and supplies.

Southern Mexico has no custom smelters of importance. The only large plant south of Aguas Calientes and San Luis Potosi is that of Teziutlan Copper Co., and that can scarcely be called a custom plant, on account of its location on a narrow-gage offshoot from a branch line. This condition is partly due to the lack of mining in the "hot country," partly to lack of transportation, and in a measure to other causes. It is, of course, easy to say that there are no smelting plants because there are no ores, but it is also to be remembered that this works both ways, and that the smelter plant has a powerful effect in the development of the mines in its neighborhood.

Reference to the location of the remaining plants of the list will show good cause for almost every one. In addition to the requirement of technical and financial skill in the management, several other demands must be satisfied to accomplish the success of any smelting enterprise in the custom field.

Primarily, there must be some mine or group of mines which will produce a large tonnage of ore that may be used as a smelting base, that is, it should have sufficient lead or copper to permit dilution with dry ores and still retain enough for a satisfactory smelting charge. Preferably, it should be of a nature to flux the remaining ores of the adjacent districts. In addition, there should be good transportation facilities, cheap fluxes, comparatively cheap fuel, ore available within reasonable distance, and a good water supply.

Chihuahua shippers are fortunate in that this combination has resulted in plants at El Paso, Chihuahua, Torreon, Velardena, and Mapimi. Completion of the railroads from the Coahuila coal fields to Escalon would seem to offer possibilities at or near Jimenez, though the freight differential in its favor would be small.

Producers in the territory adjacent to Monterrey have the choice of several smelters. The city is favorably situated in many ways. Six railroad lines enter it, and it is near the Coahuila coal fields and near the Tampico oil fields. The port is also available for import or export by water. The result is two smelters in the city, one near by and another at Saltillo, sixty-five miles up the hill.

The Concepcion del Oro smeltery, because of its location on a long, narrow-gage branch, is scarcely a custom plant except for the local mines. Matehuala, farther south, is a bit more favorably situated, in that the branch line is broad gage, but it is really a one-district plant, with Monterrey and Saltillo on one side and San Luis Potosi on the other to cut off distant shipments.

The San Luis smeltery has a splendid situation as regards transportation, except that the heavy grades on the Tampico branch make it difficult to get freight, coke, and oil up the hill with the present bad condition of the rolling stock. Shippers served by the Mexican Central Ry. south of Torreon are practically dependent on the Aguas Calientes plant, which is not quite so favorably situated as many of the other plants, except in the number of the mineral districts near by. It would seem as if the mining industry would be helped by a plant farther south, say around Celaya, but the question of a base interferes to considerable extent.

Under present conditions material improvement in the Mexican market for ores will probably be small and a long time coming.

Powdered-Coal Equipment of the Nevada Consolidated

AN IMPORTANT description of a comparatively recent installation of a coal-pulverizing plant at the Nevada Consolidated Copper Co.'s smelter at McGill, Nev., was presented in a paper at the New York meeting of the A.I.M.E. by R. E. H. Pomeroy. The plant was erected in 1918. The article contains an excellent flow sheet and a detailed description of the equipment. These particular features will make the paper especially valuable to companies contemplating similar installations. Mr. Pomeroy in concluding his paper said:

"To the end of July, 1919, the plant had pulverized 173,230 tons of raw coal. The power consumption for the entire operation has been about 30 kw-hr. per ton of raw coal pulverized. It must be borne in mind that any comparison of this figure with the power required for other systems must take into consideration the power devoted to the production of blast, usually furnished from an outside source, by which the dust is blown into the furnace.

The wear has not been excessive, considering the nature of the service, and has been confined almost entirely to the fan wheels and housings. Ample provision has been made for repairs, and no operating time has been lost while making repairs due to wear.

The capacity of the pulverizers is from 4½ to 5 tons per hour, and the plant was operated for six weeks at an average daily rate of 550 tons of raw coal. Owing to the large storage capacity for pulverized coal in the 50-ton bins, it is necessary to man the pulverizing plant only one or two shifts out of three, when not burning over 300 tons daily."

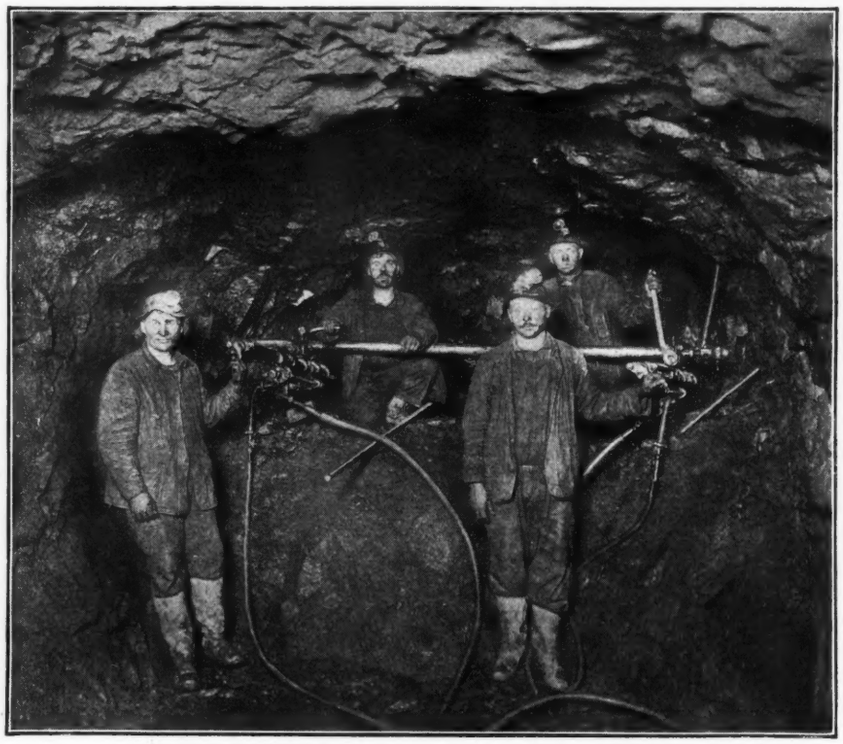
The Lake Margaret Barium Mine, in Tasmania, owned by the Colonial Barium Co., is to be reopened, according to the *Queensland Government Mining Journal*. The company has received orders for a large amount of ore.

Breaking the Michigan Record in Tunnel Driving

More Than Nine Feet of a 8 x 8-ft. Tunnel Driven Every Eight Hours at the Holmes Mine in Ishpeming—Character of the Rock Formation—Average Day's Work

Written exclusively for *Engineering and Mining Journal*

MINERS believe in miracles because they perform them, although, to the miner, these are all in the day's work. Stories of rock drilling and hard-rock mining have never lost their fascination. There is something about delving into the bowels of the earth in search of nature's treasure that appeals to the layman, whose knowledge is confined to what he has heard or read. Today mining holds forth more than ordinary appeal, for the value and quality of the work going on thousands of feet underground is a real indication of the proper kind of Americanism. Some remarkable achievements in driving hard-rock tunnels and mine drifts have been made possible by constant improvement in mining methods and in the construction and design of the tools used. Many times in the past the Lake Superior district has set the pace for this class of work, but nothing has equaled the drifting accomplished at the Holmes mine, one of the Cleveland-Cliffs Iron Co.'s properties situated at Ishpeming, Mich. Here an 8 x 8-ft. tunnel has been driven at remarkable speed, the record advance being 484 ft. in 432 hours' working time. This betters a previous record of 348 ft. made in 42 hours.



DRIFT HEADING AT HOLMES MINE, ISHPEMING, MICH.

The rock is diorite, dense and hard, a phase of massive greenstone. Some idea of its hardness is shown by the fact that 80 per cent gelatine was used for blasting. The daily working time was sixteen hours, being divided into two eight-hour shifts. Each shift crew totaled ten men, consisting of four miners and six muckers and trammers. No. 248 Leyner-Ingersoll drills, equipped with anvil block chucks, were used exclusively for the drilling. These machines were supplied with 1¼-in. hollow hexagon steel having four-point cross-bits, all of which were machine sharpened. Starters were 24-in. long with 2¼-in. gage, and this was reduced $\frac{3}{32}$ in. with each 18-in. change in length of steels.

As stated above, the tunnel drift is 8 x 8 ft. The standard "V" cut was used in drilling, requiring from seventeen to nineteen holes, or more than 100 ft. of drilling per round. Two machines were mounted on a shaft bar, three set-ups being necessary for one full cut of 9 ft. Two top cuts were drilled and blasted before shooting the bottom holes.

During the month of October, 1919, the working time totaled 432 hours, and during this time the progress was 484 ft., or 9 ft. every eight hours, reducing to 24.2 ft. advance per man employed. This not only involved the drilling, blasting, breaking and tramming of 30,976 cu.ft. of rock, but the hoisting thereof to a height of 1,300 ft. and its disposal from that point. All of this work was under the direction of Superintendent Lucien Eaton and Captain William Tramblin, who organized and directed the work. Too much credit cannot be given to them and the crews for the splendid record and its consistency. In another mine, before the installation of the most modern drilling equipment, an eight months' run of 420 ft. average was maintained, one month showing an advance of 464 ft. in 448 hours. When the new machinery was introduced the time was reduced 25 per cent. In this case, the ground was somewhat softer than the diorite, but required no timbering. This and the recent record of 24.2 ft. per man per working month in diorite with Leyner-Ingersoll drills recall other recent results obtained with similar drills in the same district. These performances are summarized thus: 21 ft. per man per month average for eight months in slates; 25.1 ft. per man in slates and graywackes; 26.9 ft. per man in slate and graywackes. Comparisons do not give correct conclusions, as the differences in mining stratified ground and igneous rocks of different hardness have so much to do with the progress made that little comparison value can be attached to them. The interest lies in the fact that such good results have been achieved by using modern tools and methods.

Whether the record of 484 ft. can be exceeded with equal conditions is doubtful, but the introduction of a mechanical loader has already opened up efforts to con-

siderably exceed this figure. There can be little doubt that the results will be bettered, for the time interval required to load broken rock in cars by hand is a large percentage of the total time required. The mechanical loader should reduce this time and increase the total working efficiency.

A Convenient Loose-Leaf Form for Survey Notes

Written exclusively for *Engineering and Mining Journal*

The accompanying illustration shows a loose-leaf form used in filing notes of underground or other surveys, which are kept in the office. When properly posted, this form will contain all the data necessary to calculate a connection between any two points in a mine, or to plot any plan, projection or section. The columns marked "Station," "Horizontal Angle," "Inclined Distance," and "Vertical Angle" are filled in from the field-book notes, and the "Bearing" and "Horizontal Distance" are calculated. The spaces in the column marked "H.I." are divided in two horizontally, as indicated.

In the upper half is set down the height of instrument, using the plus or minus sign according as the set-up is over or under the station. In the lower half-space is noted the height of roof above the floor at that set-up. This is of importance in calculating a raise to a certain point in a drift, for example, under a station in the roof. In the column "Height Point," the distance of the point sighted at above or below the station is set down, plus if above, and minus if below (usually minus), for the underground stations, generally speaking, should be in the roof (with a plumb bob suspended for the foresight).

The "Vertical Distance" is calculated from the inclined distance, vertical angle, height of instrument, and height of point, giving the difference in elevation between the station at the set-up and the station sighted. The columns marked "Latitude and Departure" show the difference in latitude and departure between the set-up station and the foresight station, and the "Total Latitude" and "Total Departure" columns show the co-ordinate distances of the stations from the center of co-ordinates. The column "Vertical Co-ordinate" shows the vertical distance of each station above or below the datum plane. The "Remarks" column is used for side notes and for sketches of shaft stations and other complicated mine openings.

The form is 12 x 18 in., and punched to fit a post binder. Notes of various levels and of different mines can easily be kept separate, more leaves being added as necessary. A duplicate set of notes can also be kept in a fire-proof vault, or sent away if required. With the addition of four columns in the "Remarks" column, this form may also be extended to accommodate level notes.

Working Place Page No.

STATION	Horizontal Angle	Bearing	Inclined Distance	Vertical Angle	Horizontal Distance	H. I.	Height Point	Vertical Distance	LATITUDE		DEPARTURE		Total Latitude	Total Departure	Vertical Co-ordinate	REMARKS
									North	South	East	West				
																Surveyor

FORM OF LOOSE-LEAF NOTES FOR OFFICE FILING OF SURVEYS

Accurate and Quick Determination of Copper in Slag

By A. M. Smoot

Written exclusively for *Engineering and Mining Journal*

The following method for the determination of copper in slag contains nothing particularly novel or ingenious from the chemical standpoint, but it permits an exact and accurate determination in a comparatively short time and should prove of value and convenience in experimental work.

Treat 5.0 gm. of slag in an 800 cc. beaker with 500 cc. of water and heat to brisk boiling. Ebullition keeps the pulp more or less in suspension. While boiling briskly add, by means of a pipette inserted under the cover of the beaker, 30 cc. of strong HCl in a slow stream delivered in the center. This takes possibly five minutes.

Continue the boiling for half an hour. The slag will be practically all decomposed, but with an initial weight of 5 gm. and the volume of solution mentioned, some silica will be separated. Remove the beaker from the hot plate and add a small quantity of hydrofluoric acid; 5 cc. is ample. Replace the beaker and continue boiling for two or three minutes. The solution clears almost immediately, leaving no undecomposed residue. Allow the liquid to cool a little and then pass H_2S rapidly into the solution for ten minutes. Copper is precipitated as sulphide. Filter the warm liquid through a 12.5 cm. filter and wash the precipitate with warm water. Filtering and washing may require fifteen to twenty minutes.

Transfer the filter to a 45 cc. fused silica crucible, dry cautiously in front of a muffle, and then ignite strongly. After cooling, add 5 cc. of HNO_3 and warm, gently at first, until the copper oxide is dissolved. Then heat to boiling for one minute, wash into a "battery beaker," add 5 cc. of strong H_2SO_4, dilute to 125 cc., and electrolyze, using about one ampere for the first hour, reducing this to half an ampere for another hour. The whole operation may be completed in four hours. If the iodide method is substituted for electrolysis for the final determination of copper, the work may be completed in less time. In the case of slags containing other H_2S group metals than copper, reprecipitation of the copper by electrolysis may be necessary to achieve the desired result.

If slags are not wholly decomposed by the treatment outlined, the copper in solution is precipitated as sulphide, which is filtered off together with the insoluble residue, which in any chilled slag will be very small. After ignition, the residue and sulphide are treated with HNO_3 and H_2SO_4 and evaporated to fumes, or, if the case requires it, the ignited residue and sulphide are fused with $KHSO_4$. The latter modification is seldom if ever required.

Selective Flotation by the Bradford Process

No Oil Necessary in This Method as Developed at Broken Hill—Particularly Suited to the Separation of Lead-Zinc Sulphides—Numerous Advantages Over the Electrolytic, Horwood, Magnetic, and Other Types of Treatment

Written exclusively for *Engineering and Mining Journal*

THE Bradford sulphur-dioxide process of selective flotation, in use for several years at Broken Hill, Australia, fills a long-felt want in this country, as it affords a solution to the treatment of many mixed sulphide ores, tailings, and slime dumps, which, up to the present, have been deemed unprofitable. Owing to the fact that sulphur dioxide has a positive deadening effect on zinc sulphide, it will work to advantage on ores in which the usual oil-starvation methods of differential flotation fail.

Numerous ores are found in this country in which the lead and zinc sulphides are in such proportions as to make the material valueless unless an economical separation of those sulphides is obtained. The problem becomes more complicated if iron is also present. The claim is made that the SO_2 process is the cheapest method for those "diseased" ores yet devised. It was invented by Leslie Bradford, an Australian mining engineer, during his researches on the separation of the Broken Hill weathered slime dumps containing mixed lead, silver, and zinc sulphides.

In treating a mixed lead-zinc sulphide ore the following commercial products are obtained:

1. A lead-iron concentrate. A high recovery of the gold and silver present in the ore is obtained in this concentrate.
2. A high-grade zinc concentrate.
3. A worthless residue which is rejected.

This process has been in use on a large scale at Broken Hill for years, and many thousands of tons have been treated. At the Broken Hill Proprietary plant alone, slimes have been treated for some years at the rate of five hundred tons per day, and a number of other Broken Hill companies are using the process. At Salt Lake City, Utah, the work of a one-ton-per-hour plant on the Midvale tailings has proved entirely successful. This is a noteworthy achievement, as the tailings assay only 2 oz. silver, 2.5 per cent lead, 6 per cent zinc, and 4.8 per cent iron. From these tailings is obtained a high-grade lead concentrate low in zinc and a high-grade zinc concentrate low in lead. The process has been adapted at Midvale by A. J. Miller and the Stimpson Equipment Co., pioneers in the application of the sulphur-dioxide process in this country.

Types of Ore Suitable

The Bradford process is eminently suitable for the treatment of lead-zinc-iron sulphide ores, lead-zinc sulphide ores, and iron-zinc sulphide ores, particularly ores containing gold and silver. Although it is not claimed that this process will treat all ores of this type, the experience has been that the percentage which respond to this treatment is high. A large number of copper-zinc ores can also be treated. There is every reason to believe that all types of mixed sulphide ores in which zinc sulphide is present as an interfering agent can be handled.

A great advantage of this process is that no costly equipment is required for experimental work, merely a cheap form of sulphur burner being needed in addition to the ordinary flotation equipment. A small unit, treating pound lots, will in all cases determine if an ore is amenable, for the results on a large scale are generally better than those which are obtained in the laboratory. It is often advisable to build a one-ton-per hour plant to confirm laboratory results, as a plant of this size gives valuable information.

The ore must be crushed fine enough to free the various sulphides from each other. In some cases through 40 mesh is sufficiently fine; in others it is necessary to slime. Experiment alone can determine this, but it is not at all necessary to crush fine when the mineral particles are not closely attached.

No Particular Type of Flotation Machine Necessary

No particular type of machine is essential for the process. In Australia, excellent results have been obtained by apparatus of the centrifugal-pump type and ordinary sub-aëration (Hebbard) machines. On American ores the Little Janney machine has been found very suitable, as both the agitation and the aëration of the pulp can be controlled independently. However, experiments conducted with unsuitable machines by operators unacquainted with the main principles of the process are likely to be expensive and misleading.

The reagents required are simple and cheap, and include:

1. Ordinary flotation oils.
2. Sulphur dioxide produced by any known method, such as burning sulphur or utilizing blast-furnace gases.
3. Sulphuric acid.
4. Niter cake (sodium sulphate containing free sulphuric acid). On many ores this reagent can be used to replace flotation oil. At the Broken Hill Proprietary plant no oil or organic material of any kind is used for flotation with this process.

The method of treatment depends on the nature of the ore, and can be determined only by experiment. In some cases, acid and sodium hyposulphite, acid and a little sulphur dioxide, or sulphur dioxide alone added to the pulp are all that is required to deaden the zinc sulphide. For many ores, however, the process must be modified as determined by experience.

Comparison With Other Processes of Selective Flotation

A comparison of the advantages of this process with others in vogue for the treatment of complex sulphide ores shows some interesting features:

Electrolytic Process. The details of treatment by this method are now well known in this country. The mixed sulphide ores are roasted to form oxides. The

zinc oxide thus produced is dissolved in sulphuric acid, and the zinc is precipitated electrolytically. The lead, silver, and other metals left as a residue are treated by smelting in the usual way.

The comparative disadvantages of the electrolytic process are:

1. It is costly to experiment with, and the erection of a plant for treatment is also expensive, neither of which holds for the sulphur-dioxide process. It is fair to state that the electrolytic process produces pure metallic zinc, and a large percentage of the cost of plant erection would have to be balanced against the cost of a zinc smelter. Smaller companies in general, however, would prefer a plant cheap to erect, and to send their zinc product to custom smelters.

2. The electrolytic process cannot be considered for the average type of ore with power higher than $20 per horsepower-year. The Bradford process is working successfully at Broken Hill with power at 1½c. per horsepower-hour.

3. The electrolytic process must produce zinc, whatever be the market price of the metal. In most ores using the sulphur-dioxide process a high profit may be obtained from the lead-silver-iron produced, alone, and the zinc concentrate, if desired, can be stored at a time of low metal prices.

4. A grave doubt always exists as to whether the electrolytic process will be successful on a large scale. This is a very serious matter in view of the capital involved. There is not the same risk with the SO_2 process.

Horwood Process. In this process, the ore requires dry crushing and careful roasting. It is on this account more costly and difficult to manipulate than the sulphur-dioxide process, and the results on the large scale are not as good.

Magnetic Process. This does not work to advantage on slimes, and therefore will not treat a fine-grained mixed sulphide ore. Also, a preliminary roasting is required.

Other Differential Flotation Processes. Types of flotation processes which aim at the deadening of the lead or iron do not work to the same advantage as the sulphur-dioxide method, for if the zinc sulphide is floated first, it usually contains the bulk of the silver, gold, and copper in the ore. In the Bradford process, on the other hand, these metals go with the lead or iron, and can be readily recovered in the smelting operation.

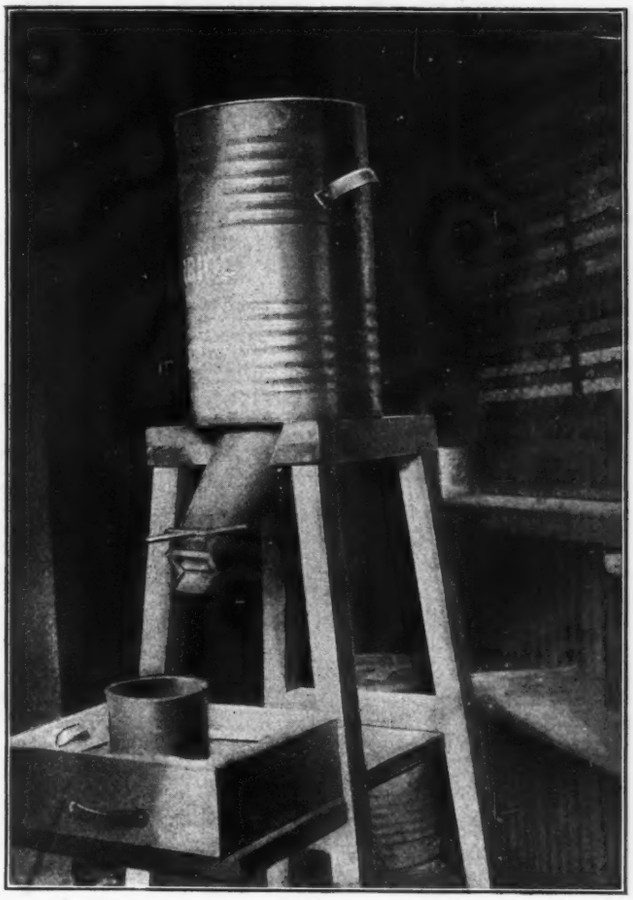
Use of Calcium Carbide in Mines

By C. H. Fry

Written exclusively for *Engineering and Mining Journal*

At Argonaut mine, Jackson, Amador County, Cal., an unusual device is used for filling pocket carbide cans. It is customary in some mines to allow the miner to fill his pocket carbide can from an open 100-lb. carbide container. He often not only fills his regular pocket can, which holds about ten ounces, but he may fill an extra can or perhaps a cap box. The amount he takes is probably sufficient for from ten to sixteen hours, and, when he comes off shift, he has more or less carbide left, which he either takes home and uses or throws away, if there is much dust in it, when he takes his day's supply the next morning.

To prevent this waste of carbide the Argonaut mine now furnishes each miner with a pocket can full of carbide each morning. (The company owns all cans so used.) When the miner comes off shift he puts his number, which in this case is on a small metallic disk, into his carbide can, and the cans are put into a large box provided for the purpose. The watchman takes the disks from the cans, empties the carbide on a screen, fills the cans with freshly oiled carbide from the filling device, and they are ready for the next day. The fines are screened from the returned carbide, and the coarse carbide is mixed with the fresh carbide. When the miner calls for his number, he is given a pocket can filled with carbide.



DEVICE FOR FILLING MINERS' CARBIDE CANS. ARGONAUT MINE, JACKSON, CAL.

The illustration shows a 100-lb. carbide can in which the bottom has been replaced by a spout having a small arc gate. This gate is slightly less in width than the width of the pocket carbide cans. One hundred pounds of carbide is dumped into a can, which has a perforated bottom, and about a quart of coal oil is poured over the carbide. When the excess coal oil has drained off, the carbide is placed in the filling device. The coal oil prevents air-slacking, and carbide which has been treated in this manner has stood exposed to the air for a week without slacking. This method of handling has reduced the cost of carbide about one-third, and at this mine is a success.

Chromite Production in 1918 amounted to 255,500 metric tons, according U. S. Geological Survey. Of this amount the United States produced 84,000 tons, or 33.9 per cent.

Iron Mines at Port Henry, N. Y.

Magnetic Iron Ores in Northern New York Are Mined by Underground Methods, Using Power Shovels To Load the Ore Into Cars—Electric Power Is Extensively Used in the Operation of Mines, Mills, and Blast Furnace.

BY CHARLES A. BLATCHLY
Written exclusively for *Engineering and Mining Journal*

THE iron ore mines of Witherbee, Sherman & Co. are situated at Mineville, about six miles from Port Henry, N. Y., at an elevation of from 1,200 to 1,300 ft. above sea level. The orebodies of this region, which are inclined and dip toward the west, are much faulted—so that the ordinary vertical-shaft method of mining is not adaptable. The ore is magnetic, averaging from 30 to 50 per cent iron and varying in phosphorus, in the form of apatite, from a bessemer to a non-bessemer ore. It is dark colored, granular in appearance, and crushes readily to a size suitable for magnetic separation.

The company owns six mines, the Harmony, New Bed, Old Bed, Sherman, Smith, and Fisher Hill. At present, however, only the New Bed, Old Bed and Harmony mines are being worked; the Smith and Sherman mines are pumping, and the Fisher Hill mine is closed down. Because of the inclination and faulting of the orebodies, shafts at all of the mines have been sunk at varying angles, with the exception of the New Bed, also known as the Barker Hill or the Tunnel mine, and here entrance to the mine is through a tunnel. Underhand stoping is used, the stopes in some places being as high as seventy-five feet, so that good working space is provided for the operation of power shovels. The nature of the rock and ore is such that the room and pillar system of mining is used, and practically no timbering, excepting that required for tramways and stairways, is necessary.

The present plan of handling the ore underground is to establish main ore pockets which are large enough to act as storage bins in case the mills are temporarily shut down. These pockets are centrally placed; the ore from the various workings, whether above or below the pocket, is hauled to the pockets either on auxiliary stopes or main levels, dumped, and then hoisted up the main stopes to the charging pocket at the foot of the shafts, whence it is hoisted to surface by three-ton skips operating in balance.

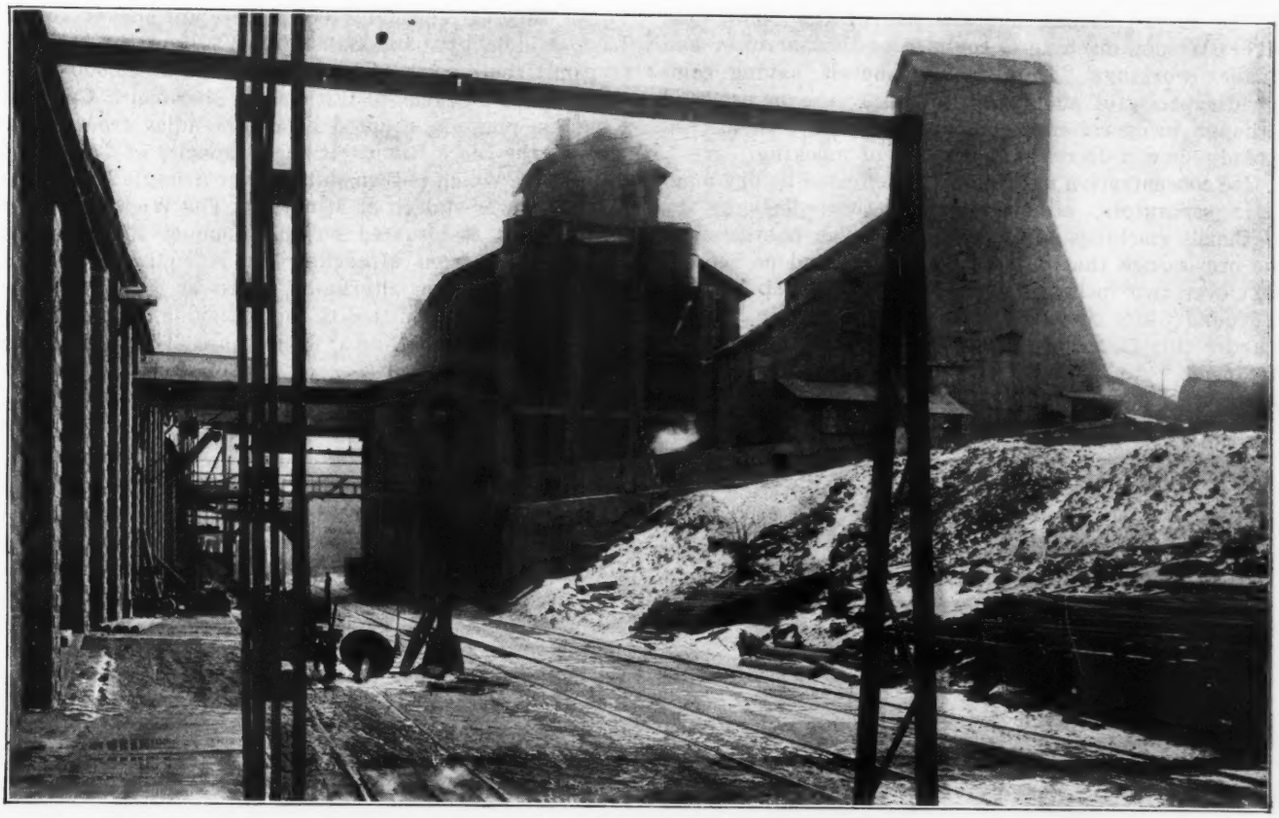
GENERAL VIEW SHOWING CENTRAL POWER HOUSE, NO. 4 MILL, AND TAILINGS PILE

Electric haulage is used throughout the underground workings. G. E. locomotives operating at 220 volt direct current, on a narrow-gage track, and capable of handling five three-ton gable-bottom cars, are used in the main haulageways. Smaller electric locomotives that have been built at the company's own shop are employed for the shorter hauls. Other electrical equipment consists of lighting and signal systems and telephone service.

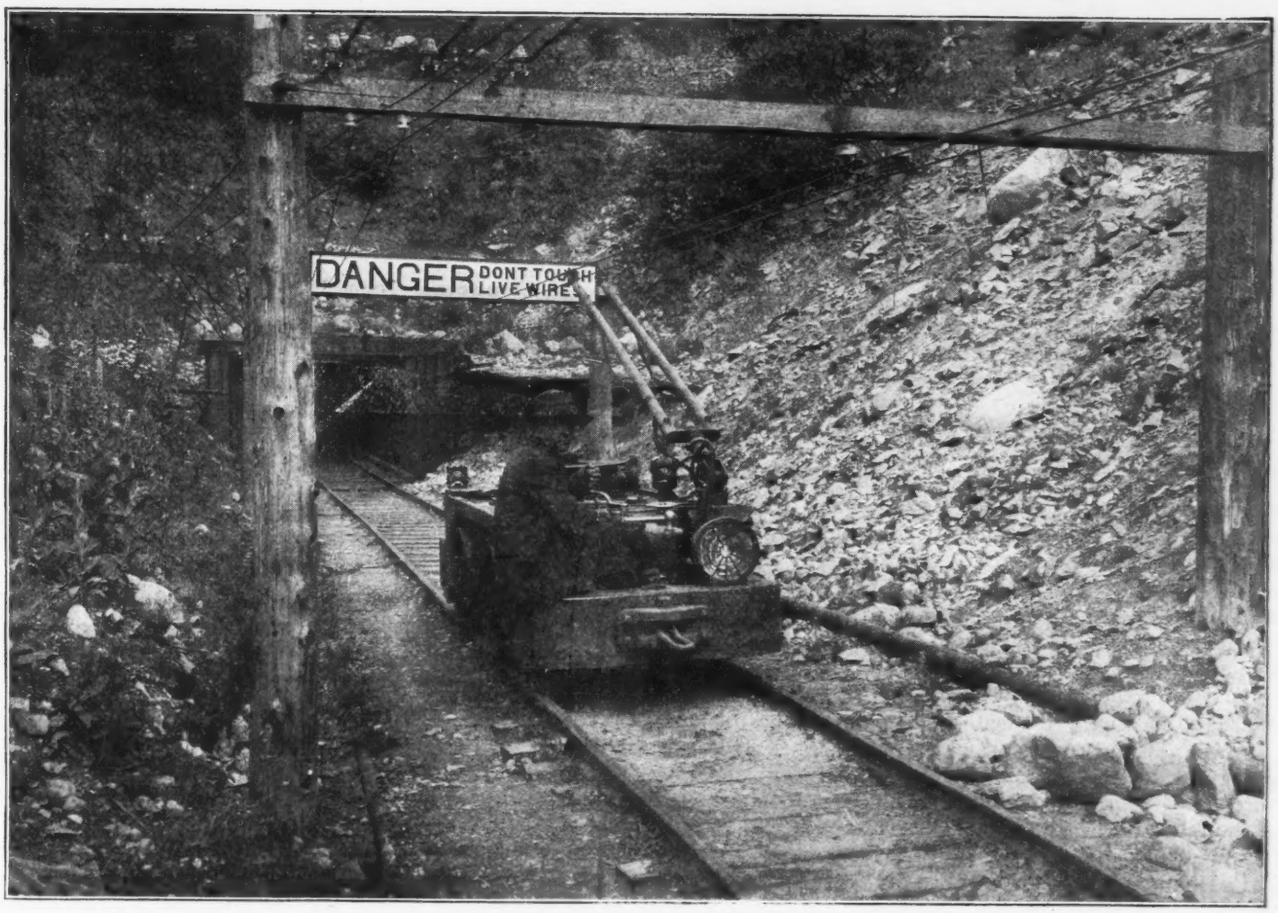
USE OF POWER SHOVELS CUTS MINING COSTS

Owing to shortage and high cost of labor, electric power shovels have been installed in the larger stopes where there is sufficient head-room and enough tonnage to keep the shovels busy. At present only one mine, the Harmony, is equipped with these shovels. The Thew shovel, designed with a special short boom, is worked

[1]A series of articles, "Magnetic Deposits and Mining at Mineville, N. Y.," by J. H. Granbery, appeared in *Engineering and Mining Journal*, May 12 and 26, 1906, and June 2, 9, 16, and 23, 1906. Mr. Blatchly's article covers only the development to bring the subject up to date.—EDITOR.



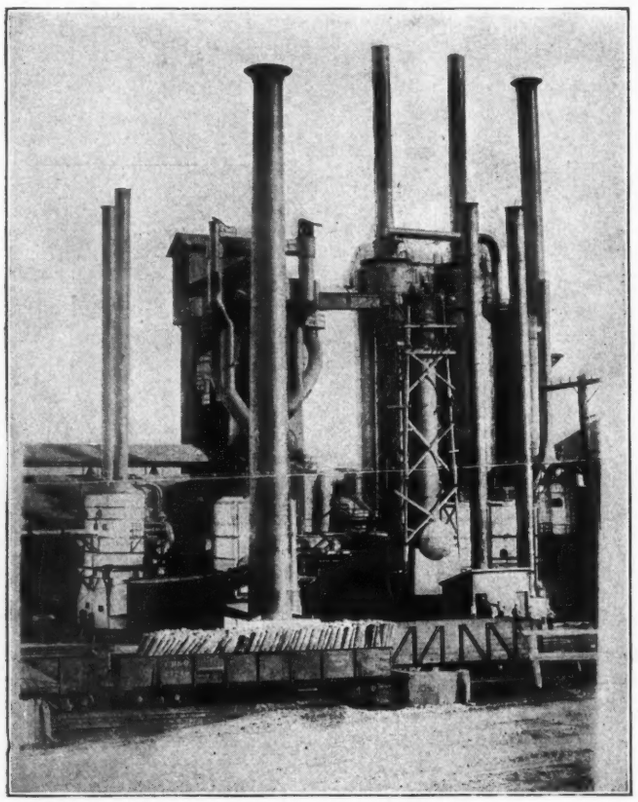
DUST SETTLING TANKS AT NO. 3 MILL OF WITHERBEE, SHERMAN & CO.



PORTAL OF BARTON HILL TUNNEL, WITHERBEE, SHERMAN & CO., MINEVILLE, N. Y.

in the largest stopes, and the use of the Halby and Myers-Whaley machine is confined to the narrower and smaller workings. Eight power shovels having combined capacity of about 800 tons daily are in use, and although in operation a comparatively short time, they already show a decrease in the cost of mucking.

Ore concentration at Mineville[2] is effected by dry magnetic separators, either by magnetic pulleys or by Wetherill machines after crushing. The character of the ore is such that it is easily broken, and no separation over two inches is attempted, all over-sizes being reground until they will pass through a 2-in. screen. During this latter process a great deal of fine dust is produced. An attempt to overcome this nuisance is being tried out in mill No. 5 by the so-called "Cyclone"



STACKS AT BLAST FURNACE PLANT OF WITHERBEE, SHERMAN & CO.

system, and this method has clarified the air in the mill to a considerable degree.

The mills, as well as buildings at the mines and some of the dwellings, are constructed of cement blocks made out of tailings on the grounds by the company, and make pleasing and durable structures. No. 1 mill was burned in 1914 and No. 2 in 1915. No. 5 mill takes the place of No. 2. No. 6 mill, which was used for concentrating apatite tailings, was destroyed by fire in April, 1919. The company now plans to discontinue the concentration of apatite at the Mineville plant and to build a fertilizing plant at Albany instead.

Power for the operation of the mines at Mineville is generated by the company, and, in addition, some is purchased from outside companies. The latter consists of the following: Hortonia Power Co., of Brandon, Vt.; the Wadhams Mills plant, the Kingdom plant, and the Port Henry Light, Heat & Power Co. The Hortonia Power Co., of Vermont, has power stations at Silver Lake, Middlebury, and Salisbury, Vt., and the stations transmit their power over a single line at 43,000 volts, 3 phase and 25 cycle, to Witherbee, Sherman & Co. The Kingdom plant is situated about six miles from Mineville, on the Black River. It has a capacity of 375-kw. at 6,600 volts, which is transmitted over a single line to the Central power station at Mineville. The Wadhams Mills power plant is situated on the Bouquet River, about twelve miles from Mineville. It is equipped with a water-wheel driven alternator, rated at 300 kw. This power is also transmitted to the Mineville central power station over a single line at 6,600 volts. The Port Henry Light, Heat & Power Co., of Port Henry, N. Y., furnishes power direct to the Witherbee Sherman plant, situated at Port Henry, on the shore of Lake Champlain.

Description of Central Power Station

The central power station of the company at Mineville has a 750-kw 3,300-volt alternator driven by a 100-hp. Nordberg horizontal cross-compound, non-condensing engine. The low-pressure cylinder on this machine is being replaced by an air cylinder, so that the engine may be used as a compressor. At Port Henry the company has a modern power house, containing two 6,600-volt vertical shaft turbo alternators equipped with both turbine and motor-driven exciters, one rated at 800-kw and one at 1,500-kw. From Port Henry the power is transmitted about six miles on a double line at 6,600 volts to the A and B compressor house at Mineville, which in turn is connected to the central power station by a single line carrying 2,300 volts. All lines running into the mines are stepped down from 6,600 volts to 3,300 volts, 3 phase, 60 cycle, at which voltage the power is redistributed to the various shops and buildings throughout the plant. Any further reduction in voltage is effected by suitable transformers at various points where further reduction is desired.

The furnace, situated on the shore of Lake Champlain at Fort Henry and formerly leased and operated by the Northern Iron Co., was taken over at the expiration of the lease by Witherbee, Sherman & Co. The last-named company has remodeled the stack, enlarged the casting shed, installed a new turbine and a new pig machine, repaired all the old boilers and stoves, built a change house equipped with lockers and showers, changed the chemical laboratory, and put in a first-aid room. The furnace is 80 ft. high, with an 11-ft. x 7-in. hearth, 16-ft. x 1-in bosh, with a single bell 8 ft. x 6 in. in diameter. The furnace is water cooled and hand filled, and has a capacity of 180 tons of foundry iron per day.

[2]A complete description of this operation appeared in *Engineering and Mining Journal*, May 18, 1918, Vol. 105, No. 20.

Separating the Metallics in Tin Slimes

The Mauss centrifugal separator, described in *Engineering and Mining Journal* of May 17, 1919, has been considerably improved and is giving excellent results in separating tin from slimes in South Africa, particularly at Zaaiplaats. The planetary motion is now obtained without the use of the high-reduction gear, which caused more or less trouble, the rotation of the buckets being brought about by an eccentric device. As a result of the new design, the separator can be run at a higher speed and can handle larger quantities of material up to forty tons per day. The planetary separator promises to be of value in all tin ore-dressing plants where fine crushing is necessary.

Shaft-Sinking Methods in the Butte District

Carefully Planned Drilling, Blasting, Mucking, and Timbering Facilitate the Work—Efficiency And Safety of Operations Depend on Proper Sequence and the Anticipation of the Needs of Shaftmen

BY HOWARD DRULLARD

Written exclusively for *Engineering and Mining Journal*

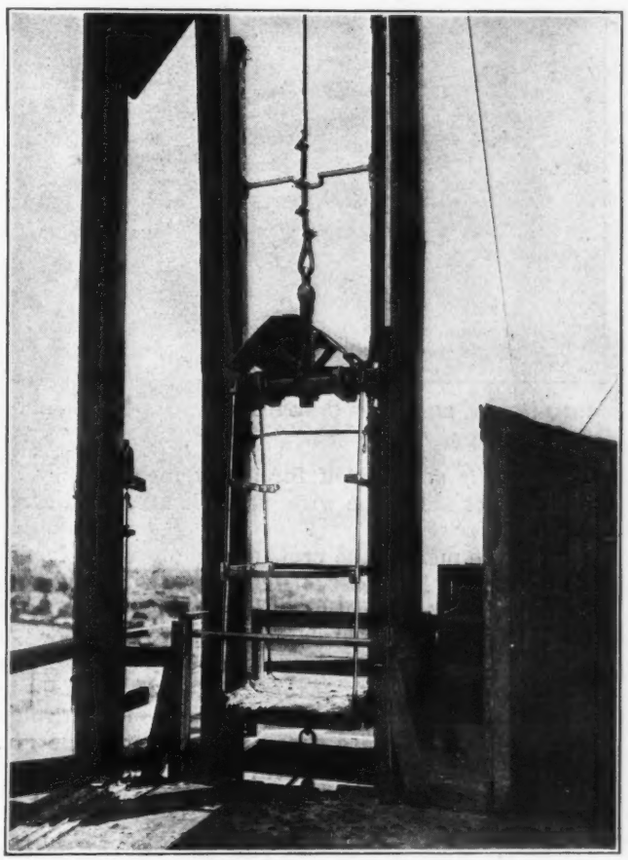
SHAFT-SINKING methods in the Butte district have been the subject of close study on the part of local mine managers and superintendents, with the result that a fairly standard practice has been developed, and it is believed that this compares favorably with the methods used in other districts. It is true that Butte sinking costs are not low, as they usually amount to about $100 per foot for the total expense, including equipment. However, with respect to the cost, several factors must be considered, particularly the fact that the Butte wage scale is among the highest in the world, and also that most sinking is now being done below the 2,000-ft. level. Substantial timbering is required on account of the heavy ground and the high speed of the large skips used.

Under normal conditions there are sixty-two working shafts in operation in the district, and it follows that to keep in advance of ore removal, sinking operations are continuous, alternating from one mine to another. Shaftmen become specialists, have steady employment, and good team work results.

It is the purpose of this article to describe in detail the methods employed locally. The present sinking operation at the Anselmo mine, under the direction of Ed Ralston, superintendent, and John Agoa, foreman, is a good example of the Butte practice. The Anselmo mine is equipped with a 165-hp., single-drum electric hoist, having a rope speed of 600 ft. per minute. One Imperial Type 10 compressor of 150-hp., with four 4 x 9 ft. receivers, furnishes the air required. A 4-in. pipe line carries the air at 90-lb. pressure to the bottom station. Below this point two 2-in. lines are used, on account of the ease of handling. Three hose connections are placed on each line, and after the sinking is completed the permanent pipe is hung and the 2-in. lines are removed.

The shaft has three compartments, two hoisting compartments 4 ft. x 4 ft. 6 in., and one pump compartment 4 ft. 6 in. x 7 ft., the outside dimensions of the shaft being 19 ft. x 6 ft. 6 in. The shaft sets are framed of 12 x 12-in. timbers, including the posts and centers; 2-in. lagging, and 5 x 10-in. stringers are used. The pump compartment is lined with 1-in. boards with sliding doors every 25 ft. Green stulls 19 ft. in length and 12 in. in diameter on the small end are used as blasting logs. A No. 7 Cameron pump is carried down as the sinking proceeds. Model 55 Waugh Clipper drills are used exclusively. The rock formation is altered Butte granite and rhyolite porphyry.

A crew of five miners per shift is employed at a contract rate of $40 per foot. Also, one shift boss and one top man per shift. During the drilling operation four machines are usually used, and the fifth man racks up steel in convenient positions for the runners and also removes the dull steel. When unusually hard rock is encountered, five machines are used and the shift boss acts as helper. Drilling begins as soon as solid rock is uncovered on one end, after blasting and mucking, and that end is thoroughly picked up. The machines and steel are brought down by the shift boss. The round consists of thirty holes, ten rows of three across the shaft. The breast, back and corner holes are drilled from 5½ ft. to 6 ft. deep. The cuts are 9½ ft. and are drilled in two rows of three each, the two rows being collared 4½ ft. to 5 ft. apart and drilled on an angle of about 45 degrees toward the opposite row. An effort is made to bottom the two rows close together. Four hours are required for drilling, and when the round is completed the machines are sent to the surface and thoroughly cleaned and oiled. From one-half hour to two hours are consumed in sending up tools, blowing holes and loading. All tools and electric lights are removed, a 5 x 10-in. bulkhead is carried down, and carbide lights are supplied before the blasting material is brought down by the shift boss.

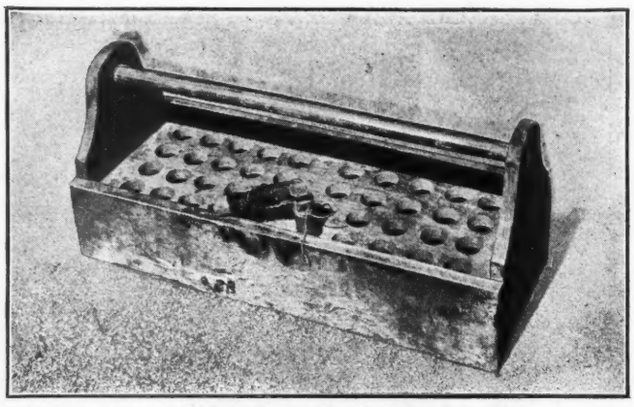


SINKING CAGE, SHOWING EXTENSION GUIDES, AT ANSELMO MINE, BUTTE, MONT.

California Ideal delay-action exploders are used. The 10-ft. lead wires are uncoiled by the electrician, inspected for broken wires and other possible flaws, given a coat of shellac, and then wound on wooden

spools. Nine delays are used, No. 2 to No. 10. The shift boss makes the primers by running a hole through the center of the cartridge, placing the cap well at the bottom of the stick and then tying the primer securely around the top and middle of the stick. The primers are placed in the box shown in the illustration, in holes corresponding to the drill holes, each delay in its proper order.

The blasting switch box is made in such a manner that is is impossible to close the door if the switch is engaged, and the shift boss only is issued a key to this box. As an additional precaution, the reel holding the 14-gage, rubber-covered lead wires is arranged so that the blasting lines cannot be reeled out without disconnecting a socket connecting the reel to the blasting box. A 110-v. lighting current is used in blasting. After the shift boss has reeled off sufficient wire to reach to the bottom and across the shaft, he takes the powder down, and sees that the insulation on the



PRIMER BOX, SHOWING CARTRIDGE AND WOODEN SPOOL FOR EXPLODER WIRES

lead wires is scraped off for a few inches every two or three feet along the wire which is stretched across the shaft.

All of the men of the crew are employed in loading the holes, the shift boss distributing the primers and noting that all connections are properly taped. The exploders are connected in multiple, one exploder wire being connected to one lead wire, the other exploder wire to the other lead. From 100 to 125 lb. of 40 per cent Repauno blasting gelatine is used on each round. The east-end holes are timed to fire last. The crew is then hoisted to the station, the connection on the reel is screwed in, and the shift boss unlocks the blasting box and explodes the charge.

Both air lines are opened full and allowed to blow for an hour before the crew returns to the bottom. No effort is made to save time by allowing the men to return to the bottom before it is well cleared of gas. The shaft crew then cleans down the wall plates, the shift boss reels out the deck cable light wires for two clusters of three 60-watt lights and sends down tools and the sinking bucket, which is fastened by three feet of chain, provided with a drop link, to the bottom of the sinking cage. The cage is equipped with 7-ft. extension shoes to allow it to pass well below the last set. Mucking is started at the center to make cage room. The east end, having been shot last, is the lowest point in the shaft, and after a depth of eleven feet is reached in this end the work of timbering is started. One wall plate at a time is swung under the cage and is lowered from the surface. Upon reaching the bottom, a chain is tied around the center of the timber, and it is hoisted into place on the hanging bolts by the engine. This is followed by the end plates and two center plates or dividers.

A deck load of 2 x 12-in. staging plank is sent down with the second wall plate, and after this staging is in place the shift boss is kept busy bringing down timber. The eight 12 x 12-in. posts and east center posts are placed in position, and the hoist is again used to lift the wall plates. The blocking is done by a man in each corner. The shift boss supervises the alignment of the set and brings down wedges in boxes, blocking and stringers. Two deck loads of 2-in. lagging and 1-in. lining boards are next brought down and put in place. The center on the west end is left out, and a jack bar substituted which permits the introduction of the wall plates of the following set by the removal of the jack bar.

The speed and accuracy with which the timbering is done depend largely on the foresight and action of the shift boss, for it is his duty to anticipate every requirement of the miners so that each detail of timbering follows in its regular sequence, and not a moment's time is lost through delays. After the set is completed the blasting logs are raised into place by the hoisting engine and are fastened by chains equipped with long finger hooks. Permanent ladders are installed, but no short sinking ladders are used in the bottom.

By following out the above method in detail, a set of timbers may be accurately hung, thoroughly blocked, lagged and completed in every respect, in from one hour and a half to two hours.

Mucking now is resumed and continued until solid rock is uncovered, when drilling with two machines is started. Particular notice is taken of any ground that requires evening up for the next set, and whatever holes are necessary for trimming are drilled and blasted with the regular round.

In shaft sinking, as in all underground operations, the most important factor is active and intelligent supervision. Every detail of the work must be carefully studied and arranged for. Even such details as the supplying of drinking water to the miners are carefully attended to at the Anselmo. The machine drills are always in perfect order; and an abundance of sharp steel and tools is always at hand. The miners do not have occasion to leave their work during the shift, and satisfactory progress results.

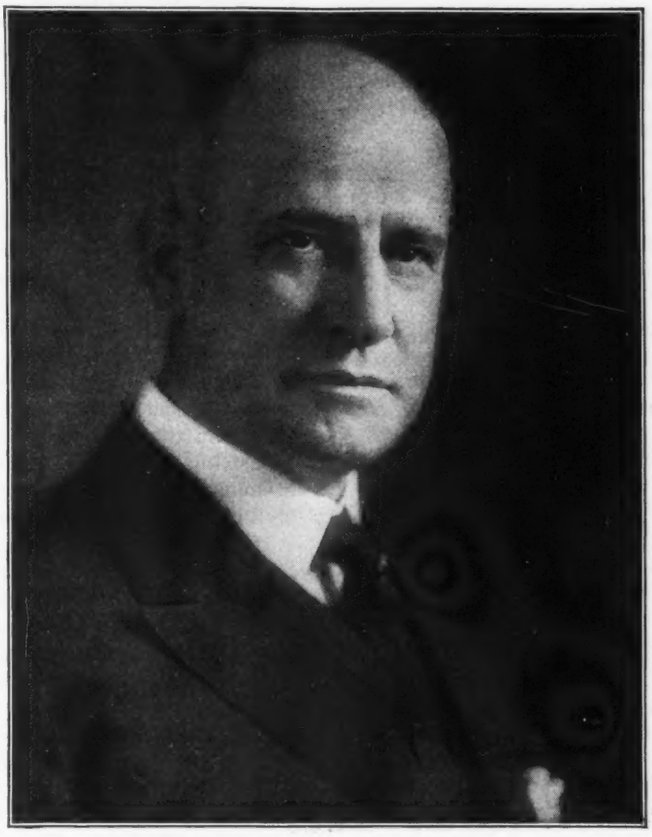
The Skinner

Much of mankind's profanity is doubtless ultimately to be attributed to the patient mule. The skinner's language is usually regarded as a model of its kind in the mining camp, and, truly, the fluency that he displays is often marvelous. But as one star differs from another in glory, so there are skinners that outshine the rest. The leader of them all is to be found in Clarence King's character, "the Pike," who modestly deprecated his ability to swear when complimented therefor. "Swear?" repeated the Pike in a tone of incredulous questioning. "Me swear?" as if the compliment were greater than his modest desert. "No, I can't blaspheme worth a cuss. You'd just orter hear Pete Green. *He* can exhort the impenitent mule. I've known a ten-mule team to renounce the flesh and haul thirty-one thousand through a foot of clay mud under one of his outpourings."

Government Officials Who Influence Mining
I. Senator Miles Poindexter

BY PAUL WOOTON
Written exclusively for *Engineering and Mining Journal*

MINING LEGISLATION in the Senate is being directed by experienced hands. The chairman of the Committee on Mines and Mining is Miles Poindexter, junior Senator from Washington. Though, in a business way, Senator Poindexter's only connection with mining has been of a legal character, it is evident that one cannot live long in Spokane without absorbing much knowledge of the mining industry. Spokane and its tributary region, Senator Poindexter points out, has furnished much of the brains, energy, and initial capital that led to the development of the great Cœur d'Alene's mining region, as well as of several districts in British Columbia. Spokane, it is pointed out, is a center in which a vast business is done in mine supplies and where the men engaged in mining in the great Northwest are wont to gather. Having rubbed elbows for many years with these interests, Senator Poindexter feels that he has some title to his place as chairman of the Senate Mines and Mining Committee. Senator Poindexter is particularly elated over the fact that mineral-leasing legislation is on the statute books. He regards the passage of the mineral-leasing act as one of the great constructive accomplishments of the generation. As a result of the progress that will come with this law, he expects an unprecedented development in the public land states, Montana, Idaho, Washington, Oregon, New Mexico, Arizona, California, Utah, Colorado, and Nevada. The oil land leasing act specifically relates to unappropriated public land containing coal, phosphate, oil, oil shale, and gas.



SENATOR MILES POINDEXTER, OF WASHINGTON

One of the great needs of the mining industry, Senator Poindexter believes, is more scientific research on the part of the Government. Few other industries, he says, are so dependent on technical research for their progress and development. Great dividends have been paid on Government expenditures for studies of agricultural problems. The success which has followed the Government's agricultural work should be the incentive to Congress to increase the scientific study of questions of importance to the mining industry, which, more than any other great activity, is dependent upon research. Senator Poindexter regards mining experiment stations as a step in the right direction, and holds that their numbers should be increased and the scope of their work extended. Personally, he is just now much interested in having the co-operative station at Moscow, Idaho, conducted as a first-class mine-experiment station. Senator Poindexter recently took a courageous stand in the interest of the magnesite industry. Despite the great pressure behind the dyestuffs embargo bill, he opposed its progress, declaring that the magnesite tariff bill must have a place on the Senate calendar before a vote should be taken on the dyestuffs measure. Following his action, the Senate Finance Committee promptly reported the magnesite bill. He holds that the development of the magnesite industry is one of the striking indications of what may be accomplished by American genius and resource. With practically no pre-war production of magnesite, miners in Washington and California were faced with the immediate necessity of finding 300,000 tons of ore to meet the war-time requirements of steel mills and smelting works. With unparalleled energy, and by the application of the most intelligent methods, the great needs of the country were met. Senator Poindexter feels that the nation, when aware of the importance of the matter, should approve a tariff schedule which will allow this domestic industry to survive.

Senator Poindexter, who is a candidate for the Republican Presidential nomination, was born in Memphis, Tenn., April 22, 1868. His education was obtained at Fancy Hill Academy, in Rockbridge County, Va., and at Washington and Lee University at Lexington, Va. Immediately on receiving his degree from the law school of the university, Mr. Poindexter proceeded to Walla Walla, Wash., to begin the practice of his profession. A year later he became prosecuting attorney of Walla Walla County. After a residence of six years in Walla Walla, he moved to Spokane, where for a number of years he was assistant prosecuting attorney for Spokane County. In 1904, he was elected judge of the Superior Court of his district. He remained on the bench until his nomination for Congress. Following active service for his state in the House of Representatives, he was elected to the Senate for the term beginning March 4, 1911. He is now serving his second term.

CONSULTATION

The Troubles of a Cyanider Can You Help Him?

"I am unfortunately unable to supply all the data, but if one of your readers cares to venture a diagnosis on such information as I can provide, I should be grateful to him. Here is the case: A cyanide mill which had been standing idle was put into operation. The zinc shavings in the precipitation box, on which there remained some gold from the previous run, were well washed before pregnant solution was turned into the box. The zinc-box tailings were higher in value than the feed. Thinking this was probably due to the zinc still being coated with 'white precipitate,' the zinc was again thoroughly scrubbed. The tailings showed no improvement. A new vacuum pump had been installed, which did not degas the solution as well as the old one, the latter having been discarded, as it did not have an adequate capacity. I thought for a short time that the trouble might lie here, but relinquished the idea, as I should have had to stretch the facts to accommodate the theory. I thought the filtered solution might not be absolutely clear; but it proved to be quite free from slime. The NaCN content of the solution was 1 lb. per ton, the lime content 0.8 lb. per ton.

"The zinc in the upper compartments appeared to be out of condition, due to the long period of inactivity; it was of a sickly gray color. The precipitation box had five compartments. The zinc in the first two was removed, the remainder was moved up and new lead-coated shavings were added to compartments 4 and 5. There was a small temporary improvement, then up went the tailings again. A test was made for alkaline sulphides in the solution, but they were absent—at any rate at that time.

A lead-acetate drip was tried at the head of the box without benefit. Incidentally, I am opposed to the use of such a drip at this point of the flow sheet, owing to the precipitate formed on the addition of lead acetate to a cyanide solution. The cyanide strength of the solution was then increased locally to 2 lb. per ton. This extra addition caused a liberal evolution of bubbles in the compartments, and the gold content in the tailings fell to a trace.

"In time, the circulating solution showed a cyanide content of 1.8 lb. per ton, and having obtained good results shortly before with that strength, the addition of cyanide at the head of the zinc box was discontinued. In a day or two the bubbles became few in number, and the tailings began to climb up. Only the addition of fresh cyanide in quantities sufficient to cause a relatively profuse bubbling effected a satisfactory precipitation. These bubbles may, of course, have helped by preventing any chemically formed slime from settling on the zinc. Polarization was hindered by gently agitating the shavings twice a day. The addition of fresh cyanide as a regular business was out of the question, as it increased the zinc consumption and the cyanide loss in the mill tailings. It seemed to me that there must have been present in the solution some salt toward which gold was more positive than zinc, or which, by interaction with the zinc, was precipitated thereon as a protecting slime. It is unlikely that the salt was formed as the result of the mill having been idle for several weeks, because no trouble was experienced on a former occasion after a similar shutdown.

"The ore from the mine was rather different, as it came in part from a higher level, where the stope faces had become partly oxidized. The ore is quartz, carrying free gold, auriferous pyrite, and galena, with a trace of copper.

"The mill was shut down after a couple of days, pending readjustment, and within forty hours an assay of the solution in the five compartments showed that about $100 had already been re-dissolved.

"Such are the data available. Will somebody be kind enough to hazard an opinion? Those who have operated small plants intermittently may have had similar trouble. Little has been written on the subject, possibly because one does not like to advertise the fact that he has taken the pains to dissolve gold which cannot be, or rather has not been, precipitated. In the circumstances the cyanide process is like a dog that has exhausted itself chasing its own tail. If I remember aright, a writer in the technical press stated that the phenomenon of re-solution of gold in a zinc box could be attributed either to carelessness or ignorance. I plead guilty to the latter charge.

"When zinc-boxes are to remain idle for some weeks, ought the compartments to be filled with water or with cyanide solution, or is it a question of being placed anyway between the devil and the deep sea?"

The trouble, it would appear, lies in the zinc box, as with high zinc-box tailings the gold must have been dissolved in a fairly satisfactorily manner. Were you careful always to have the solution of the proper alkalinity? Was your lime of good quality? You might have tried a little soda. Possibly the partly oxidized ore resulted in an undue concentration of soluble base-metal salts, which formed a coating on the zinc. You speak of a trace of copper in the ore; did you see any evidences of copper depositing in the zinc box? Perhaps there was enough to make removal necessary. You seem to have been trying to work with a rather weak cyanide solution.

If the solution was not always perfectly clear, possibly a filter could have been used to good advantage in the first compartment. The zinc shavings should never be exposed to the air longer than necessary, and in resuming operations you should have tried fresh shavings in all compartments.

We are publishing your letter, and no doubt some of our readers will have suggestions to offer which will throw a little light on your difficulties.

Listing Mining Shares on New York Curb

"We desire to list the shares of our company on the New York Curb Market, but we are entirely uninformed as to how to go about it. Will you please advise us what steps to take?"

If a mining company desires to list its shares on the New York Curb Market its first step is to communicate with the secretary of the New York Curb Market Association, 25 Broad St., New York City. The New York Curb Market Association will forward to the mining company an application blank to be filled out by the mining company's officers.

The listing requirements include a detailed statement of assets and liabilities; earnings and expenses; engineer's report; certified copy of charter and bylaws; map of property; copy of annual report or prospectus; list of officers and directors, with addresses and banking references; transfer office and registrar at New York; certified copies of any leases; confirmation of titles and other rights; specimen copy of stock certificate; check to cover listing fee of $200; and name of broker who will handle the stock on the New York Curb Market.

THE PETROLEUM INDUSTRY

Oil Possibilities in the James Bay Region

To ascertain the oil possibilities of the shales and limestone in the portion of Ontario lying south of James Bay, Dr. M. Y. Williams, of the Canadian Geological Survey, during the summer of 1919, made an examination of the exposures along the Mattagami and Abitibi rivers. In stating the result of his investigation, Dr. Williams observes that the extensive Palæozoic area lying south and west of James and Hudson's bays is known to contain formations of the same age as oil-bearing formations elsewhere, but no oil seepages have been discovered. This may be due to the long period of weathering along the rivers, which may have dissipated any oil formerly present, and to the heavy burden which covers the interstream areas. The Trenton formation outcrops on the Nelson and Churchill rivers; the Niagara on the Nelson, the Albany, and intervening rivers; and the Salina and the Onondaga (Corniferous) on the lower Albany and the Moose River with its tributaries. From analogy with other occurrences, these formations may be expected to contain oil, but economic accumulations may be looked for only where there is an impervious cover to retain the oil in the formation, and where the structure is favorable for oil accumulation.

In the region drained by the Moose River and its tributaries, the Onondaga limestone and Salina shales are known to occur. Although the Salina is not generally oil-bearing, some of the lower dolomite beds of this formation contain large quantities of oil in parts of southwestern Ontario. As the Salina consists of alternating shales and limestones, it is probable that suitable cover exists for any oil-bearing horizons which may be present. The Onondaga limestone, which has been the most uniformly productive formation of southwestern Ontario, outcrops at the surface over wide areas, and for that reason an impervious cover is generally lacking.

In the vicinity of the Long Rapids of the Abitibi River, and about four miles above the Long Rapids of the Mattagami River, the Onondaga is covered in part by impervious shales. The areas known to be covered are comparatively small, however, and unless larger areas occur beneath the interstream regions in the vicinity, it is scarcely likely that extensive accumulations of oil are present in the Onondaga. The shale areas probably indicate the deepest part of the basin, and consequently a suitable location for testing the lower formation. The structure in the Long Rapids region of the Abitibi River consists of a well-marked series of low folds, with smaller subsidiary folds superimposed on the larger ones. On the Mattagami River the formations lie nearly flat.

As pre-Cambrian rocks outcrop at various places throughout the region east of the Abitibi River, it is scarcely probable that the Palæozoic basin is very deep anywhere in their vicinity. More likely, the basin is deeper to the west, the center possibly being near the center of the Onondaga outcrops in the interstream region between the Moose and the Albany rivers. It is doubtful whether a depth of Palæozoic strata greater than 600 or 700 ft. is to be expected even there.

The Geology of the Peace River District, B. C.

A report by Prof. J. C. Gwillim, of the Mines Branch, Queens University, Kingston, Ont., on the oil possibilities of the Peace River district, British Columbia, has been laid before the Provincial Legislature. Hon. T. D. Pattullo, Minister of Lands, who sent Professor Gwillim into that country last summer to carry out a preliminary geological reconnaissance, in presenting the report said that "it seems highly desirable that much more extensive work should be carried on during the coming year, with some detailed work in certain localities. The report is of a valuable character."

Professor Gwillim directs attention to similarities between the oil-bearing formations of southern Alberta and conditions found in the Peace River district. The strata are traced from the Rocky Mountains down to the rolling foothills, where they flatten out and rest at low angles between the great trough or syncline in which flows the Peace River. The following formations were met in descending order: (1) Smoky River shales; (2) Dunvegan sandstones; (3) St. John shale; (4) Bullhead sandstone with Triassic shales and sandstone below. The Bullhead sandstones are considered to be the shoreward equivalent of the Peace River sandstones. It is near the base of the latter that oil is found on the lower Peace River at about 1,100 ft. below the river level. "There is no proof," Professor Gwillim continues, "that oil exists in or beneath the Bullhead sandstones, but the possibilities are sufficient to justify extensive reconnaissance work in adjacent areas by a large oil corporation."

Production Royalties Range From One-Third to One-Eighth

The production royalties on leases of Government oil lands under the claims relief section of the Oil Land Leasing Act are prescribed by the Department of the Interior within limits of 33⅓ to 12½ per cent. All withdrawn land now being operated under claim falls under this royalty. The maximum applies to wells producing 200 bbl. or more per day, the royalty being graded down to 12½ per cent for wells producing less than twenty barrels per day. The maximum royalty applies also to wells producing oil specified as 30 deg. Bé. or over; for oils of lower quality the maximum royalty is fixed at 25 per cent down to a minimum of 12½ per cent. These royalties apply to all Government oil lands on which claimants settled prior to their withdrawal under the act of Sept. 27, 1909, and which are producing practically all the oil now flowing from the withdrawn areas. Circulars No. 671 and 672 of General Land Office contain regulations for oil shale, oil, and gas permits. They have just been issued.

Oil Prospects in the Rogue River Valley, Oregon

No Petroleum Has Yet Been Found, but Local Interests Believe Chances Are Good—Will Drill Several Wells

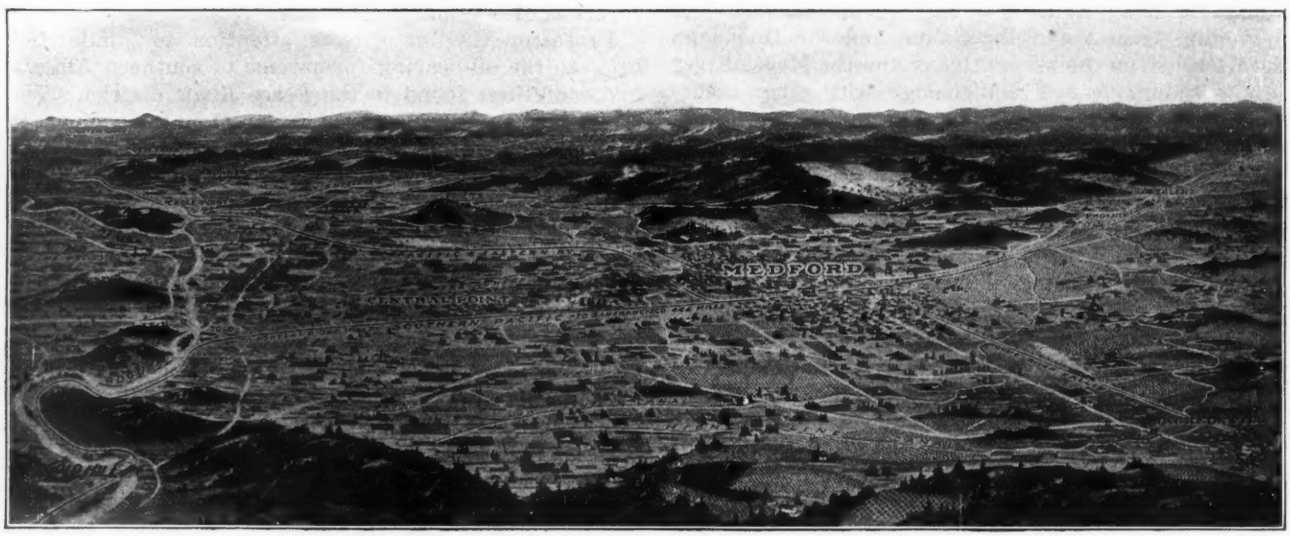
BY A. E. KELLOGG
Written exclusively for *Engineering and Mining Journal*

THE Oregon Bureau of Mines and Geology made an extensive geological study of the Rogue River Valley last summer for oil and gas, but has not yet made an official report. Its investigation aroused the people of the valley to such an extent that they are willing to invest a goodly amount of their savings in local oil exploration. They are not yet "oil crazy," but exceedingly "oil interested," and the developments now going on and being planned in the valley lead almost every one not only to talk, but to invest. Four oil companies with extensive leases have been wholly locally financed, two of which are prepared to drill, and the prediction is confidently made by many that, before the year is over, at least twenty wells will be drilling.

The oil prospects are closely associated with the coal deposits, which occur at numerous localities in the valley lying between the Cascade Mountains on the east and the Siskiyou Mountains on the west. The coal belt, long and narrow, begins on Evans Creek, in the Umpaqua Mountains, north of Sams Valley, stretches to the south and southeast through Sams Valley into Rogue River Valley east of Medford and Ashland, and continues through the Siskiyou Mountains into California, a total distance of 100 miles.

The Cascade Mountains, east of the coal belt, are made up mainly of Tertiary lavas; the Siskiyou Mountains on the west are composed of granular igneous rocks and a smaller proportion of pre-Cretaceous sediments.

The soft rocks in which the Rogue River Valley has been cut are sandstone, shales, and conglomerates. They dip generally eastward, extending beneath the greater portion of the lava fields of the Cascade Mountains. The older sediments along the western portion of the valley, by Bear Creek from the foot of the Siskiyou Mountains to Ashland, Phœnix, and Jacksonville, are Cretaceous in age and do not contain coal. The coal-bearing rocks lie east of Bear Creek as far north as



VIEW OF ROGUE RIVER VALLEY, IN SOUTHWEST OREGON, LOOKING DUE EAST. MOUNT PITT, 9,500 FT. HIGH, IN THE BACKGROUND, AND CRATER LAKE AT THE EXTREME LEFT

Interest in oil really started some months ago, when the Trigonia Oil Co. was organized by Medford men, and began to interest and educate the public with propaganda. At first most people were skeptical, but gradually, as expert opinion piled up from authorities who had examined the geology of the valley, confidence was created.

Prior to the formation of the Trigonia company, J. F. Mundy and associates, of Medford, began drilling a well five miles east of Medford. Work was discontinued owing to various hindrances, but was recently resumed, and the well is now down 400 ft. No stock has been offered for sale, and the promoters, although having confidence of final success, are close mouthed as to their activities.

The Trigonia company has its equipment on the ground a mile east of Phœnix, and will soon be drilling; and the Vulcan Oil & Gas Co., with headquarters at Medford, is assembling equipment in Sams Valley, six miles out from Gold Hill.

Medford, but beyond this point they overlap the Cretaceous rocks and occupy the whole northern part of Rogue River Valley.

Tests of shale and sandstone from all over this territory give a paraffin residuum. All of these tests have been made from what are practically surface croppings, which still retain volatile gases.

It has been claimed by local geologists that seismic disturbances in the remote past had in all probability so broken up the underlaying strata as to permit the escape of whatever oil might have been stored in the valley. This is controverted by oil experts, who point out that the shale, coal, and sandstone were undisturbed when the mountains were formed, that the sandstone anticlinals are still intact, and that the stone is of a coarse-grained variety which is considered favorable.

The Largest Smokestack in the world is at Anaconda, Mont. It is 585½ feet high, 86 feet wide at the bottom, 60 feet wide at the top, and the walls are 5½ feet thick.

NEWS FROM THE OIL FIELDS

High-Grade Petroleum in Argentina

Recent Discoveries Considered Favorable—Petroleum Wells To Be State Property

The discovery of petroleum in the mining district of Plaza Huincul, Territory of Neuquen, was officially announced, according to *Commerce Reports*, March 9, 1920, toward the end of 1918, and the results of a quantitative analysis of samples of oil taken from there were said to be very favorable. A Buenos Aires journal announces that the Minister of Agriculture intends to make arrangements on a large scale for the distillation of the crude petroleum obtained from the state oil wells.

The following account of the Plaza Huincul discovery has been translated from *La Nación:*

"The geological studies pursued in 1914 by Dr. Juan Keidel, chief of the geological section of the Department of Mines, Geology, and Hydrology of the Ministry of Agriculture, demonstrated that the eastern zone of the Territory of Neuquen presented indications of abundant petroleum deposits. Preliminary work was started on private initiative in the vicinity of Cerro Latena, at Cuvunco (north of the railway line), and at Challaco (10 kilometers to the north of the station of that name). All of these attempts failed. In 1915 the geologist, Dr. Keidel, was given the mission of selecting a point at which to bore No. 1 well. Work was begun in February, 1916. The hardness of the subsoil and the scarcity of water greatly delayed the boring, which attained a depth of only 608 meters in October, 1918, petroleum very rich in light products having been struck. Immediately on ascertaining the existence of the petroleum, Dr. Keidel fixed upon four points in the vicinity of well No. 1 for petroleum borings, and one for water supply. At present work at all these points is in progress, depths of 410, 140, and 52 meters having been reached in the petroleum borings.

"The quality of the petroleum is excellent, according to the analysis made by the chemist of the Board of Mines, Dr. Hercelles Corti, who obtained the following mean results: 24 per cent of naphtha (of 62 to 150 deg.); 38 per cent of kerosene (of 150 to 300 deg.); 25 per cent of oil, gas oil, lubricant, and paraffin, with a 13 per cent residue which solidifies when cool."

The government has lately submitted a project of law to Congress relative to petroleum wells, declaring them all to be state property and providing that they shall be prospected or exploited either by the national government itself, or for its account through provincial governments, or private firms.

Canada's Petroleum Regulations Amended

Increase in Acreage Rentals and Foreign Capital Favored—The New Rates

By an order in council dated Jan. 29, 1920, according to *Commerce Reports*, March 9, 1920, Section 40 of the Canadian regulations relating to petroleum and natural gas was rescinded and a paragraph more favorable to the investment of foreign capital in oil-exploration enterprises in the Dominion was substituted. Section 12 is also amended, and the rentals for oil leases are raised to double the former rates. The discovery of oil in considerable quantities in different parts of the Province of Alberta has led to greatly increased activity and has greatly enhanced the value of petroleum rights granted under the regulations, and the rental fixed in the year 1910 now appears to be inadequate in view of the development which has taken place and the discoveries which have been made.

The regulations for the disposal of petroleum and natural gas rights, the property of the crown in Manitoba, Saskatchewan, and Alberta, and a portion of British Columbia, the Northwest Territories and the Yukon Territory, approved by order in council dated March 11, 1910, provide that the rental of a location shall be at the rate of 25c. an acre for the first year and at the rate of 50c. an acre for each subsequent year of the term of the lease. These rentals have been changed to 50c. and $1 per acre per annum respectively, the increase of rental to apply to all applications on and after March 1, 1920.

Section 40 was amended to read as follows:

"Any company acquiring by assignment, or otherwise, a lease under the provisions of these regulations shall be a company registered or licensed in Canada and having its principal place of business within his majesty's Dominion."

Secretary Daniels has issued a statement to the effect that there is a prospective shortage of fuel for the oil-burning vessels of the fleet. The Shipping Board has received offers for only a little more than a million barrels of fuel oil after advertising for 40,000,000 barrels for use of its ships.

According to Washington dispatches, the Government has decided to take over the oil production of the Osage Indian Nation, amounting to 15,000,000 bbl. per year, for a fuel oil supply for the Navy, the War Department, and the Shipping Board.

Will Erect Oil-Shale Plant in Colorado

First Unit To Be 350 Tons' Daily Capacity—First Commercial Plant To Be Erected in State

The State Oil & Refining Co., with headquarters at 110 Nassau St., New York, has notified State Oil Inspector Duce that a contract has been let to the Gas Machinery Co. of Cleveland, Ohio, for the first unit of a 2,000-bbl. oil-shale plant to be erected in western Colorado, where the company has holdings of oil-shade lands near De Beque and Grand Valley.

The first unit will be of 350 tons' daily capacity, and its estimated cost is $280,000. It will be the first commercial oil-shale plant erected in Colorado, and will employ the Wallace process for extracting the oil from the shale. Plans are being prepared for a refinery which will be built in connection with the extraction plant works, both plants involving an outlay of upward of $2,000,000. A. M. McDonald is president of the company, and will be its managing officer. Officers of the company will arrive in Denver about March 20.

Humble Oil Brings In 4,000 Barrel Well

A well flowing 4,000 bbl. per day from a depth of 3,250 ft. was completed recently by the Humble Oil & Refining Co. at West Columbia. This follows closely on the completion of a 6,000-bbl. well by the Texas Co. at Humble at a similar depth. In old fields as well as new gushers can sometimes be struck. The first successful oil well was completed in the Humble field fifteen years ago.

Magnolia Petroleum Co. Doubles Capitalization

At the annual stockholders' meeting of the Magnolia Petroleum Co., held at Galveston March 10, 1920, the capitalization of the company was doubled, making it $12,000,000. Officers are: John Sealy, president; E. R. Brown, vice-president and general manager; B. H. Stevens, assistant manager; Courtney Marshall, secretary; W. C. Proctor, treasurer; John C. Greer, general counsel.

The U. S. Bureau of Mines has just issued a list of the oil refineries in the United States. There are 373 completed oil refineries in twenty-three states. Their total daily capacity is 1,530,565 bbl. The number of refineries under construction is 99, of a combined daily capacity of 263,500 bbl. These figures are of Jan. 1, 1920,

ECHOES FROM THE FRATERNITY

SOCIETIES, ADDRESSES, AND REPORTS

Federal Department of Mines Proposed

Declared To Be the Country's Most Pressing Need, and Essential to the President

Among the many stirring editorials in the *Mining Congress Journal* for March one headed "A Department of Mines" touches us particularly. It reads in part as follows:

"The war proved conclusively that the nation must at all times depend for basic supplies on the mineral, coal, and oil producers of America. Industrially, financially, and strategically the mining industry as a whole is the greatest collective American industry and second in importance not even to food production.

"The U. S. Bureau of Mines, as now constituted, was brought into life by the efforts of the American Mining Congress. When the Bureau was created it would have been impossible to have secured the passage of a law creating a department of mines with representation in the Cabinet. The developments of the past two years, however, have shown the necessity to the mining industry of having an independent creative organization with powers of initiative, which could present its plans directly to the President and have the benefit of executive action based on a complete knowledge of all facts involved, rather than a Bureau devoid of power to express itself and dependent on the final decision of a departmental head who may not have comprehensive information of the real issues nor the time in which to become familiar therewith.

"It has also been shown conclusively, we believe, that the enlarged developments of the mines of America are a requisite to the further development of peace-time commerce throughout the nation.

"The American Mining Congress strongly favors the establishment of such Governmental agency as will coordinate the construction and public works of the Government, for there is ample reason for such organization; but we wish to call attention very positively to the fact that the transfer of the Bureau of Mines and the Geological Survey to a new department [proposed Department of Public Works] would be no improvement on the situation as it now exists, and would continue to prevent definite expression of the needs of the mining industry in administrative affairs.

"Geological investigation and metallurgical research have no special relation to river and harbor improvements, irrigation systems, or the construction of public buildings. These engineering activities of the Government should be brought into more harmonious working relations, but it does not follow that such organization shall be represented in the Cabinet. On the other hand, the development of mining presents problems extremely varied and comprehensive. The executive discretion is frequently exercised, and the President should have the first-hand information of a confidential advisor who has practical as well as theoretical knowledge of every condition underlying the problems calling for solution.

"The mining industry is strong enough to stand upon its own feet, to declare its desires in this matter and to insist upon occupying a position commensurate with the importance of the industry."

A Mining Scholarship for Chileans at M. I. T.

Chile is basically a mineral country and her future industrial and commercial status depends largely on the development of her copper and iron ore fields and nitrates. The Chile-American Association, which was organized in 1918 for the purpose of promoting good relations between Chile and the United States, notes this condition and is establishing scholarships at the educational institutions of the United States. The first to be established is the "Chile-American Association Mining Scholarship" at the Massachusetts Institute of Technology.

Selection is to be made by competitive examination from among recent graduates of Chilean mining schools. The examination will be held at Santiago, and the successful competitor will be formally designated by the President.

The administration of the scholarship will be under the direction of the members of the association in the United States, in co-operation with the Chilean Ambassador at Washington. The members of the association are: The American Smelting & Refining Co., the American International Corporation, Bethlehem Chile Iron Mines Co., Chile Exploration Co., Braden Copper Co., Chile Steamship Co., Andes Copper Mining Co., Santiago Mining Co., E. I. du Pont de Nemours Export Co., International General Electric Co., Ingersoll-Rand Co., W. R. Grace & Co., Singer Sewing Machine Co., J. P. Morgan & Co., National City Bank, and Errazuriz Simpson & Co. The association also has the following honorary members: Señor Beltran Mathieu, Ambassador of Chile in the United States; Hon. Joseph H. Shea, Ambassador of the United States in Chile; Elihu Root, Nicholas Murray Butler, Dr. Leo S. Rowe, Henry P. Fletcher, former American Ambassador to Chile, and Señor Emilio Edwards, Consul General of Chile in New York.

American Relief "Food Drafts" Now Available

Practicable Method by Which To Help Europe Get Back to Work and Stable Conditions

Under the skillful and experienced management of Herbert Hoover, the American Relief Administration is successfully distributing packets of essential foodstuffs to the stricken people of Central European cities. An individual in America can purchase a food draft at his bank, mail it to his relative or friend, and be assured that the recipient will receive from the American warehouses established abroad just the items and quantities specified on the face of the draft.

The usual draft bears four options on its face: For $10 the holder may receive 24½ lb. of flour, 10 lb. beans, 8 lb. bacon and eight cans milk, or 7½ lb. cottolene and twelve cans of milk. For $50 proportionately more may be drawn. The plan snould appeal particularly to the millions of mining and technical workers who cannot afford to spend more than $10 at a time for the relief of their European relatives. Ten dollars spent thus brings about 50 lb. of the best material to the sufferer, whereas packed and shipped personally one must pay 95c. parcels post charges on a scant 5 lb. package that cost, say, $1.75 for contents. Centers for European distribution are at Warsaw, Prague, Vienna, Budapest, and Hamburg.

Mr. Hoover appeals to engineers to make known the facts, as the food drafts may be secured from any bank, and desires that measures be adopted to interest the foreign born in the possibilities and value of the food-draft system.

Colorado Section of A. I. M. E. Elects Officers

The annual meeting of the Colorado Section of the American Institute of Mining and Metallurgical Engineers, recently held at the Savoy Hotel in Denver, elected the following officers: W. H. Leonard, of the Denver Rock Drill Co., chairman; Robert Hursh, of the Empire Zinc Co., vice-chairman; Horace F. Lunt, State Commissioner of Mines, secretary-treasurer, and J. C. Roberts and P. M. McHugh, members of the executive committee. The organization is in a most flourishing condition.

Safety Engineers Meet

American Society of Safety Engineeds held a meeting at the United Engineering Societies Building, New York City, on Friday, March 19. Papers presented dealt with safety matters relating to elevators.

THE MINING NEWS

LEADING EVENTS

Colorado Commission Proposes To Tunnel Through Divide

Would Bore Near James Peak, at Marshall's Pass and at Cumbres Pass—Will Cost $1,000,000 Per Mile

At the last regular session of the Colorado Legislature, provision was made for a railroad commission empowered to make investigations regarding the feasibility of the state constructing three tunnels through the continental divide. This range of mountains divides Colorado into two natural divisions generally known as the eastern and western slopes and, on account of the altitude of the mountain ranges, seriously affects transportation between these sections and impedes the development of the agricultural and mineral resources of the state.

The railroads now cross the divide at an altitude of approximately 11,000 ft. and during the winter months transportation is seriously hampered by snow blockades, often tying up traffic for weeks at a time. Heavy grades, in some instances as high as 4 per cent, add greatly to the cost of transportation for the entire year.

The commission has just issued a preliminary report embracing a plan for the boring of three tunnels, one near James Peak, in northwestern Colorado, $6\frac{4}{10}$ miles in length, one at Marshall's Pass, in midwestern Colorado, 6 miles in length, and the third at Cumbres Pass, in the southwestern part of the state, $1\frac{1}{4}$ miles long.

The cost of these bores is estimated to be approximately $1,000,000 per mile. It is proposed by the state railroad commission that the state shall construct these tunnels and that they shall be used by the railroads on such terms as will pay interest on the bonds and create a sinking fund for their redemption. It is also planned that the tunnels shall be made available for the use of automobiles and other vehicles and that a considerable revenue shall be derived from this source.

An amendment to the state constitution, authorizing the issue of bonds and the creation of a commission to construct these tunnels, will be submitted to the voters of Colorado at the November election.

The taxable wealth of Gila County, Ariz., has increased in ten years from $5,000,000 to $162,000,000. Railroads and cattle are now valued at more than the 1909 total assessment. Town lots and improvements are as much more. Mines represent nearly $120,000,000, smelters $4,749,000, concentrating mills $11,781,000, and machinery represents $4,851,000.

A. S. & R. Takes Over District Mill at Leadville, Col.

Plant Will Be Used for Experimental Work in Preparing Low-Grade Complex Ores for Smelting

It was suggested at the annual meeting of the Colorado Metal Mining Association, held last January, that in order to encourage the production of low-grade complex ores, the American Smelting & Refining Co. should establish custom mills, in connection with its Colorado smelters, which should be sufficiently elastic to treat different grades of ore, preparatory to smelting. In line with this suggestion the smelting company has recently taken over the Leadville district mill which is situated at Leadville.

Work on the transformation of the mill into a modern experimental plant is now being carried out, with the purpose of determining milling processes adapted to the treatment of Leadville's low-grade mixed ores.

Advanced experimental work with Leadville ores will be carried on under the direction of metallurgists of the American Smelting & Refining Co. It is believed that investigations will result in the erection of a mill in connection with the Leadville smelter, of sufficient capacity to treat a large tonnage of ore from that district, which can not now be profitably mined and treated.

Santa Gertrudis Superintendent Killed at Pachuca

R. A. Corcoran, an American citizen and superintendent of the Santa Gertrudis mine near Pachuca, Hidalgo, Mex., was shot through the heart on Feb. 28 by his confidential clerk, a Mexican named Alfredo Ibarra, for no other reason than that Mr. Corcoran had refused to allow him the day off. C. A. Lantz, general manager, F. H. Welsh, general superintendent, and J. F. Berry, general superintendent of mines, of the Santa Gertrudis Co., all of whom were present when Ibarra made his deposition shortly after the murder, said he could offer no logical excuse and that he was not under the influence of liquor. They further stated that Ibarra was not considered a dangerous man and had not, so far as they knew, ever carried a gun. Ibarra was held in the Pachuca jail on a charge of murder.

Corcoran was thirty-three years old, having been born at Madison, Wis., in 1886, and married. His wife had left Pachuca but two weeks before with their two-year old son to return to their home in Laredo, Tex. Corcoran was well liked by Americans and Mexicans.

E. J. Longyear & Co. Contracts for Flin Flon Development

Great Activity at The Pas—Provincial Government Will Probably Build Railroad to Property

Great activity prevails at The Pas, Manitoba, the nearest railway point to the Flin Flon copper property, which has just been taken under option by Col. W. B. Thompson and associates who are rushing supplies, men and materials to the property before the sleighing breaks up. The purchasers have also bought the machinery and surface plant of the Mandy Mining Co.'s property at Schist Lake, three miles from the Flin Flon deposit. The dismantling of this plant is also being rushed to enable the purchasers to move it by winter sleigh road to the Flin Flon.

The E. J. Longyear Co. has been awarded a contract to sink two shafts and do a large amount of drifting on the Flin Flon. The contract for this work was signed the day after the signing of the option, and a large amount of supplies and equipment is on the road. An effort is being made to get the supplies in before the breakup, as the ice cannot be counted on after April 1. Summer transportation for any large quantity of supplies is almost an impossible proposition.

The Flin Flon property is situated 85 miles from railway. To treat the ore successfully a smelter will have to be built in the vicinity and a railway constructed from The Pas to Flin Flon lake, a distance of about 85 miles.

Edward Brown, provincial treasurer of Manitoba, states that the province is committed to the project of building a railroad to the Flin Flon copper property provided that the owners of the mine will give certain undertakings to the government. The question, he said, had been fully considered by the Manitoba government and a plan of action decided on. The road will be 72 miles long and the cost is estimated at $2,500,000. The government will build and own the railroad and lease it to the Canadian National Railways, the latter furnishing the equipment.

On Copper Lake near Cranberry Lake, about 12 miles east of the Flin Flon, diamond drilling will begin about April 15 where a promising discovery of quartz carrying galena was made by J. P. Gordon and associates. The diamond drill is now being moved by Smith & Travers from the Mandy property at Schist Lake to the Gordon claims, and preparations for drilling are under way, camps being built and the orebody stripped in preparation for the drilling.

Michigan Engineers Register Under New Law

Statute Affects All Engaged in State, County, Municipality or Township Work—Became Effective March 1.

Most of the mining engineers employed in the Michigan copper country and on the iron ranges of the state have registered under the new state statute which specifies that all architects or engineers who desire to carry on work for the state, county, municipality or township must be registered engineers or architects. The new law took effect on Mar. 1, and all engineers who had been practicing in the state for two years prior to May 1, 1919, were granted the right to use the title of the branch of engineering in which they have been engaged. The registration fee is $20, which entitles the holder to a registration card until 1925, when new certificates will be issued for $5 for a five-year period. Those who apply for registration now must show that they have had six years practical experience, or four years of work in an accredited engineering school and two years of practical work, or else submit to an examination by the state board of architects and engineers.

The act does not apply to engineers employed by railroad or other interstate corporations whose employment is confined to such corporation, whether such employee is or is not a resident of the state of Michigan. The board will register engineers of other states and of foreign countries when they are recognized as consulting specialists in some branch of their profession and have had at least ten years experience as such, or when they present credentials showing that they have qualified for such work under equivalent laws of their own states or governments, and are still in good standing.

The new law is intended only for those engineers who engage in state, county or municipal work, but many of the mining engineers of northern Michigan do municipal or township work and must have certificates if they desire to continue in this class of work.

Hollinger Company Criticised

The balance sheet of the annual report just issued by the Hollinger Consolidated Gold Mines, of Porcupine, Ont., shows lands in Kansas as a capital asset. The shareholders are left to surmise that this refers to oil lands, as the word oil is not mentioned in the report, and no statement other than the item shown in the balance sheet is given in the report. The company is being criticised for not informing the shareholders on this matter and the fact that the directors of the company own most of the stock is not sufficient excuse for not doing so. When the Nipissing company took up oil lands in Texas the shareholders were immediately circularized and not a single shareholder had a criticism to offer. The Nipissing is now down 2,600 ft. and still drilling. In addition a new hole is being started.

Inspiration Buys Warrior Copper Property at Miami, Ariz.

The Warrior property of eleven patented claims has been sold by the Warrior Copper Co. of Miami, Ariz., to the Inspiration Consolidated Copper Co. for a consideration reported to have been $500,000. The Warrior is a Pennsylvania corporation with main offices in Philadelphia. Spencer D. Wright is president and Ernest B. Tustin secretary.

The property lies about a mile north of Miami, adjoining the Inspiration on the north and west and is reached by the Inspiration railroad. It has been known under the name of Black Warrior. Its first development was about 1890 by William H. Beard and Perry Howell, who sold the claims, about 1895, to James A. Fleming. The purchaser had ideas concerning a new process for leaching the chrysocolla ore and erected a reduction plant at a cost of at least $500,000, only to meet with failure. In 1905 the Warrior company bought the property and thereafter gained profit by shipments of 10-per cent ore to smelters. In 1909 a lease was taken by Hoval A. Smith and H. B. Hovland, who organized the Warrior Development Co. Much development work was done, by drilling mainly, and about 9,000,000 lb. of copper was produced within two years, till the market price went too low to furnish a profit.

Since 1912 the principal operation has been under a lease by Henry Snell and William Fisk, of Globe, with large shipments of ore averaging above 6 per cent copper. The main development has been through the Winnie shaft, 500 ft. deep, through six levels and several thousand feet of lateral work. Little has been done below 300-ft. depth and the mine is believed to have possibilities unexcelled in the district.

Hayden Stone Representative Visits Cloncurry Field

Mr. Berry, a mining engineer representing Hayden Stone & Co. of New York, has recently (written Feb. 9) been visiting the Cloncurry field in North Queensland, Australia, to inspect the properties of the Mount Elliott, Ltd. This company holds a number of leases in the Cloncurry district besides being interested in the Mt. Oxide property 160 miles distant and about 80 miles beyond railway communication. Information is not available at the moment as to the intentions of the mining company (which is controlled from London), but the district offers wonderful scope for the investment of capital in the development of the mines and erection of a central treatment plant. Up to the present the field has been very successful, but unfortunately many of the deposits have been worked out leaving low-grade ore which by itself will hardly pay the cost of mining treatment and transport. There is hope, however, if operations are tackled on a large scale.

Dual Mineral Control in British Columbia Unsatisfactory

Development Retarded in Esquimalt & Nanaimo and Dominion Railway Belts—Amendment Sought

An unsatisfactory condition exists in respect to the control of the minerals in the Esquimalt & Nanaimo Ry. belt, a section approximating 2,110,054 acres on Vancouver Island, B. C. Within this area the province owns the precious metals, and the Esquimalt & Nanaimo Ry. the base metals. Consequently prospectors and mine operators, when working in this section, are brought into contact with the aggravating necessity of acquiring title to any mineral that may appear worth possessing from two parties. Gold and silver rights come from the province; also all actual mining operations are amenable to the regulations as set out in the Mineral Act. Rights to base metals and surface rights come from the company. This puts the company in the position of being able to exact any tribute that may seem good to it. Usually this takes the form of a royalty on all ore extracted. Because of this condition, it is maintained, the development of the mining industry in this particular area has been retarded, and the Government, with the approval of the Legislative Assembly, has endeavored to effect an adjustment satisfactory alike to the province and the company. The matter is now before the House. The efforts made apparently have not as yet met with much success.

A condition similar in some respects is found within the limits of what is known as the Dominion Railway Belt, an area including about 17,050,000 acres along the line of the C. P. R. on the provincial mainland, and also in the Peace River block, including about 2,500,000 acres. An arrangement exists at present under which the prospector or miner may obtain title to both precious and base metals within the belt and the surface rights necessary to operate. The prelude to this involves compliance with both dominion and provincial regulations. Although there is more red tape attached to this procedure than there would be if the control were vested solely in the province, the conditions are not particularly onerous.

T. D. Pattullo, Minister of Lands, is asking the provincial legislature to pass a resolution asking the dominion government to turn over its rights in these two areas to the province. His argument is that the dual control of these lands makes satisfactory administration extremely difficult and that the development of the province, as a result, is being retarded.

Helium gas, as produced by the Navy Department, has been characterized by Professor Kammerlingh Onnes of the University of Leiden, Holland, as practically perfect. Professor Onnes is the only man who has been able to liquefy this gas.

New Ontario Mining Association Elects Officers

The organization meeting of the Ontario Mining Association was held in Toronto on March 9. The object of the association is to foster the development of the industry and to co-operate with the Mines Department of the Ontario and Dominion governments.

By collecting and consolidating data and statistics relating to the industry the association will be in a position to supply authoritative information hitherto unavailable in the hope that the people of Ontario may gain a more reasonable and keener appreciation of the importance and problems of the industry.

The following is a list of the officers and directors: President, A. D. Miles, Toronto; first vice-president, A. F. Brigham, Porcupine; second vice-president, Col. R. W. Leonard, St. Catherines; directors: C. V. Corless, Sudbury; C. D. Kaeding, Porcupine; H. H. Kee and H. Park, Cobalt; F. L. Culver, Kirkland Lake; Mr. Cowie, Sault Ste. Marie; W. A. Carlyle, Ottawa; G. H. Gillespie, Madoc; A. J. Young, G. C. Bateman, P. J. Bickell and Alexander Fasken, Toronto; and secretary-treasurer, B. Neilly, Toronto.

Practically all producing mines, as well as a large proportion of the more important properties under development in the province, are already members of the association, making it apparent that the Ontario Mining Association will represent the mining industry as a whole. A permanent office is being established in Toronto.

Wages Raised at Kirkland Lake, Ontario

Kirkland Lake operators have raised the wage scale 75c. a day. The old rate for miners was $4 and the new one $4.75. Muckers and common labor will be paid $4 to $4.25, depending upon ability. This is the first time that a sliding scale of this sort has been in effect in any mines of northern Ontario. It is thought that Porcupine will soon follow suit. There has been a good deal of discontent over the wages paid, as miners in Sudbury receive $4.75 a day and in Cobalt the February scale was $5.50 as against $4 being paid in Porcupine. To offset this, partially, however, the Porcupine mines opened company stores, which are stated to have reduced the cost of living to employees about 15 per cent. There is talk of a strike in Porcupine in the spring unless a raise is granted.

The Utah Power & Light Co. is making application to the state public utilities commission for permission to charge increased power rates. Officials in making the request declared that the company's budget for 1920 amounted to $5,209,950, as capital expenditure, stating that this was practically synonymous with new construction, and that the budget had been kept as low as possible on account of the difficulty in securing capital.

Operators Want New Geological Survey of Cobalt Area

Cobalt mine operators are asking the provincial government for a geological resurvey of the Cobalt area. Since the original survey was made no further work has been done in the camp, and at that time there was very little underground work as compared with today. The original geological work was remarkable for its accuracy, but it is felt that the camp would be benefited by a contour map of the underlying Keewatin formation. Work of this sort in addition to being of benefit to the operators might succeed in extending the limit of the mineralized area.

Snowslide in Big Cottonwood Canyon, Utah, Kills Two

The unusually heavy snowfall in the Cottonwoods during four days of the first week in March, which was the heaviest of the winter, has been responsible for the unfortunate death of two men, Harry Gardner, superintendent of the Woodlawn mine, near the head of Big Cottonwood Canyon, and Fred Hansen, a veteran miner in the district. The two went out on the afternoon of March 6, as the storm was abating, for the purpose of locating cross-wires in the power line to the property, which for two days had been without power. It is thought possible that the men, whose bodies have been recovered, in walking around on their skiis may have started the slide which resulted in their death, but it is more probable that the slide was due to the melting of the surface snow by the rays of the afternoon sun. Owing to the steep grades in the Cottonwoods, and the resultant prevalence of snowslides, mining companies operating in the district have taken care to locate mine buildings in protected places, so as to ensure the safety of their men. It is several years since any buildings have been swept away, with accompanying loss of life.

A recent dispatch from the Silver King of Arizona Mining Co., at Superior, Ariz., states that the 600-ft. level crosscut is in 50 ft. from the new shaft and within 60 ft. more will cut the main orebody. When this is done the mine will be unwatered to this level, leaving 200 ft. of stoping ground available for extraction as milling ore. The ore in the 600 station and drift is showing native silver. The track from the new shaft to the ore bin has been completed.

The sixteen-inch streak cut at the 600-ft. level in the new shaft on Jan. 27 last ran well in silver, four inches assaying 188 oz. and twelve inches 57.6 oz. In January the mill heads ran as high as 24.8 oz. silver per ton and the concentrates from 510 to 1,509 oz. silver per ton. The mill heads in February ran as high as 25.6 oz. silver and the concentrates from 538 to 1,246 oz. to the ton. Thus far in March the heads have assayed as high as 42.1 oz. and the concentrates from 501 to 1,523 oz. to the ton.

British Columbia Engineers' Bill Opposed by Prospectors

The prospectors of British Columbia, who are now well organized, are vigorously opposing the proposed B. C. Engineers' Bill which has been before the private bills committee of the provincial legislature for several weeks. This measure contemplates the protection of members of the engineering profession practicing in the province by the formation of a council to which outsiders, before engaging in their calling in British Columbia, would have to prove their qualifications and either obtain permanent or temporary certificates. It is being advocated chiefly by the civil engineers but is made to include mining engineers, and to this the prospectors, whose president, J. W. Mulholland, has been doing some energetic lobbying, take exception for a variety of reasons. The chief of these is that it would interfere with the investment by foreign capital in the mineral areas of the province. The Canadian Mining Institute, through its general secretary, Mortimer Lamb, also has expressed its disapproval, taking the position that it should be laid over for a year.

Recent Production Reports

Arizona Copper Co. produced 3,000,000 lb. copper in February.

Alaska shipped to the United States in February 6,829 gross tons of domestic copper ore, matte, etc., the copper contents of which were 5,121,609 lb. and the value $973,602.

East Butte's smelter output of copper in February was 1,460,360 lb. against 1,438,000 in January.

Oriental Consolidated Mining Co., Unsan, Chosen, obtained $88,000 from its February cleanup compared with $94,335 in January. Production in both months was smaller than usual owing to lack of water for power purposes.

Shattuck Arizona Copper Co. produced 340,384 lb. copper, 597,043 lb. lead, 7,402 oz. silver and 84.37 oz. gold in February against 316,970 lb. copper, 740,595 lb. lead, 8,269 oz. silver and 84.54 oz. gold in January.

Greene Cananea's February production was 3,400,000 lb. copper, 142,620 oz. silver and 765 oz. gold, against 3,000,000 lb. copper, and 114,090 oz. silver in January.

Cerro de Pasco's copper production in February was 4,718,000 lb. against 4,616,000 in January.

Calumet & Arizona Mining Co.'s smelter treated in February 5,268,000 lb. of copper, of which 3,948,000 lb. is available for the company.

New Cornelia Copper Co. produced in February 3,518,000 lb. of copper, of which 2,872,000 lb. was cathode and 646,000 lb. was cement copper.

The February copper production of the Phelps Dodge Corporation totaled 7,585,500 lb., as against 7,962,200 lb. in January and 9,185,000 lb. in February last year.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

Alaskan Development Board Proposed

An Alaskan Development Board is proposed in a bill which has been introduced by Representative Curry, of California. The board is to be composed of three persons, who are to be appointed by the President and confirmed by the Senate. The term of each member is to be seven years. The members of the board must reside in and maintain their principal and branch offices in the territory of Alaska. Not more than two members of the board are to be appointed from the same political party. They are precluded by the provisions of the bill from engaging in any other business or employment. The annual salary of the chairman is to be $8,500. The other members are to receive $8,000 annually. The board is to "have jurisdiction and control over the care, use, and disposition of all reserved and unreserved public lands, including forests and waters and resources therein, over fish and fisheries, seals, reindeer, mines, minerals and mining."

The board is to have all the authority now being exercised in Alaska by existing executive departments and commissions. The board is to be under the general supervision of the Secretary of the Interior. Any decision by the board may be appealed to the Secretary of the Interior.

The way has been made easier for such a bill by the recent statement of former Secretary Lane, who called attention to the urgent need of such a board for Alaska.

Help Sought for Gold Industry by Lightening Taxes

Relief of producers of gold and silver from the income and excess profits taxes is proposed in a bill introduced March 10 by Representative Evans, of Nevada. The bill was referred to the Committee on Ways and Means. Representative Evans declares that with labor and material costs at their present level there is no hope for the gold mining industry unless the chance of profit is increased by providing exemption from these taxes. The situation in the silver mining industry also is sufficiently critical, it is believed, to justify tax exemption for the producers of that metal as well.

The Committee on Weights and Measures of the House on March 10 reported favorably a bill providing for the coinage of special 50-cent pieces in commemoration of the centennial of Maine's admission to the Union as a state.

New War-Minerals Relief Bill Formulated by House Committee on Mines and Mining

Differs Radically From Joint Resolution Previously Considered—Provides That Appellants From Commission's Award Must Provide Security Against Possible Decrease

Appeal to the Court of Claims of any war-minerals case is provided for in a bill formulated by the House Committee on Mines and Mining. All appeals from the award of the Secretary of the Interior must be filed within ninety days after the new law takes effect or within ninety days after the Secretary's award has been announced. The measure also provides that security must be filed with the Court of Claims to safeguard the Government in case the Court of Claims should allow a less amount than that paid by the Secretary of the Interior. The bill, as agreed upon by the committee, reads as follows in its entirety:

"Be it enacted by the Senate and House of Representatives of the United States in Congress assembled that the second paragraph of Section 5 of the act entitled 'An act to provide relief in cases of contracts connected with the prosecution of the war and for other purposes', approved March 2, 1919, is hereby amended by striking out the words 'that the decision of said Secretary shall be conclusive and final, subject to the limitations hereinafter provided', and the semicolon following such words.

"The fourth paragraph of said section is hereby amended by inserting after the words 'that nothing in this section shall be construed to confer jurisdiction upon any court to entertain a suit against the United States' a comma and the following words: 'Except as provided in Section 6'.

"Section 2. That such act of March 2, 1919, is hereby further amended by adding at the end thereof a new section to read as follows:

"Section 6. (a) That any claimant who has filed a claim under Section 5 within three months after March 2, 1919, whose claim has been rejected, or who is not satisfied with the decision, adjustment, liquidation or payment of net losses by the Secretary of the Interior under such section, may file a petition in the Court of Claims for the final determination of such losses. If, before this section takes effect, the Secretary has made a final decision of such claim, the petition must be filed within ninety days after this section takes effect; and in all other cases within ninety days after such final decision is made.

"(b) The Court of Claims is hereby given jurisdiction to hear such claims *de novo* and to render judgment in accordance with Section 5 for such amount as it finds to be justly and equitably due to the claimant in adjustment, liquidation, or payment of such losses.

"(c) Any payments made to the claimant under Section 5 shall be certified by the Secretary of the Interior to the Court of Claims and after judgment has been rendered by the Court, no further payment shall be made under Section 5, unless in conformity with such judgment.

"(d) The receipt of any amount, or the giving of any acquittance or release by the claimant under Section 5 shall not be a bar to the remedy provided for by this section; but if any amount has been awarded and paid under Section 5 the petition may not be considered until the petitioner executes a bond in an amount and with sureties satisfactory to the Chief Clerk of the Court of Claims, conditioned that if the Court finds that a less amount is due than has been awarded by the Secretary of the Interior, the claimant will forthwith pay to the United States so much of the amount received under Section 5 as is in excess of the amount found due by the Court. Any amount thus paid to the United States shall be credited to the funds available for the paying of awards under Section 5 and of judgments under this section.

"(e) Upon the filing of a petition in the Courts of Claims under this section the Secretary of the Interior shall forthwith certify to the court all the testimony taken in the case and all documentary evidence introduced or considered by the Secretary or any commission appointed by his authority and such testimonial evidence shall be used and considered by the Court upon the hearing and trial of the claim and shall be given such weight as the Court may determine.

"(f) Each judgment rendered by the Court of Claims under this section shall be certified by the Chief Clerk of the Court to the Secretary of the Treasury, who is hereby authorized and directed to pay to the claimant the amount of such judgment out of the revolving fund created by Section 6 of the act entitled 'An act to provide further for the national security and defense by encouraging the production, conserving the supply, and controlling the distribution of those ores, metals and minerals which formerly had been largely imported, or of which there is or may be an inadequate supply,' ap-

proved October 5, 1918, which fund shall remain available for such purpose until all such judgments have been paid: Provided, that when the amount of such judgment so paid, plus the payments made to claimants and the expenses of administration under Section 5 of this act (after allowance for amounts repaid to the United States under subdivision (d) of this section), reached the sum of $8,500,000, no further payment from such revolving fund shall be made by the Secretary of the Treasury under this section, or by the Secretary of the Interior under Section 5."

The bill differs so radically from the H. J. Res. 170 that it was necessary to go through the formality of introducing the measure. This was done by Representative Garland, the chairman of the committee, and the new bill received the number of H. R. 13,041. An unexpected difficulty was encountered when the Speaker decided that the bill comes within the purview of the Judiciary Committee rather than the Committee on Mines and Mining. At this writing, however, it is anticipated that the matter of jurisdiction will not be contested and that the bill will be reported favorably, as already decided upon, by the Committee on Mines and Mining.

The membership of the House is not sufficiently well acquainted with the equities involved in this measure to have any very decided opinions one way or the other, but the probabilities seem to point to passage of the measure in amended form. It is believed that an amendment to preclude any payments before a final award will be urged. It is pointed out that in case of the payment of an award by the Secretary of the Interior, the Court of Claims would have to have security of a readily negotiable character to cover the entire award, as it is within the range of possibility that the Court of Claims might set aside the claim entirely.

Opinions differ as to the effect of such legislation on the war-minerals claims. Some believe that the fact that findings may be minutely reviewed by an exacting judicial tribunal will have the effect of eliminating any hearsay and informal evidence from the considerations of the War-Minerals Relief Commission. Others think that the effect will be a more liberal allowance of awards by the War-Minerals Relief Commission, with the idea of forestalling an appeal from its decision.

Stock Dividends Not Subject to Income Tax

Stock dividends of corporations are not subject to income tax and the Revenue Act of Sept. 8, 1916, imposing such tax was declared invalid by the U. S. Supreme Court in a decision announced on March 8 by Justice Pitney. Minority opinions upholding the tax were delivered by Justice Holmes and Justice Day, and by Justice Brandeis and Justice Clarke.

Report Made on Standardization of Government Workers' Pay

Compensation and Annual Increase for Geologists, Mining Engineers and Petroleum Engineers

After the most thorough investigation ever made of salary classification in the Government service, a joint Congressional committee has submitted to Congress a detailed report recommending substantial increases in pay for nearly every class of Government worker. Salaries for technical service were found to be strikingly out of line with those paid in private employment. Senator Jones, of New Mexico, the chairman of the committee, commented on the report in the following words:

"Generally speaking, the lower clerical services and lower grades of other services have been remunerated reasonably well. They have received, perhaps, more than is paid for similar service in private employment. In the technical branches of the service, however, the pay has been grossly inadequate. It has not been comparable at all with the salaries paid for the same service in private employment.

"Our report will show that there was a crying necessity for this work. The personnel in the Government service is being employed and the work is being conducted without reference to any system. There is little to prompt efficiency and literally nothing to insure a maintenance of effort. To my mind one of the most important features of the report is that part which contemplates increased pay for increased efficiency and decrease in pay when there is a decrease in efficiency."

Standardization of compensation for geologists and mining engineers is recommended by the committee as follows (the annual increases are shown in each case):

Aid in geology, annual compensation: $1,200—$1,320—$1,440—$1,560—$1,680—$1,800.

Junior geologist, annual compensation: $1,800—$1,920—$2,040—$2,160.

Assistant geologist, annual compensation: $2,400—$2,520—$2,640—$2,760—$2,880—$3,000.

Associate geologist, annual compensation: $3,240—$3,360—$3,480—$3,600—$3,720—$3,840.

Geologist, annual compensation: $4,140—$4,320—$4,500—$4,680—$4,860—$5,040.

Senior geologist, annual compensation to be determined by Congress.

Director, Geological Survey, annual compensation to be determined by Congress.

Mining Engineering

Mining engineering aid, annual compensation: $1,200—$1,320—$1,440—$1,560—$1,680—$1,800.

Junior mining engineer, annual compensation: $1,800—$1,920—$2,040—$2,160.

Assistant mining engineer, annual compensation: $2,400—$2,520—$2,640—$2,760—$2,880—$3,000.

Associate mining engineer, annual compensation: $3,240—$3,360—$3,480—$3,600—$3,720—$3,840.

Mining engineer, annual compensation: $4,140—$4,320—$4,500—$4,680—$4,860—$5,040.

Senior mining engineer, annual compensation to be determined by Congress.

Director, Bureau of Mines, annual compensation to be determined by Congress.

Petroleum Engineering

Junior petroleum engineer, annual compensation: $1,800—$1,920—$2,040—$2,160.

Assistant petroleum engineer, annual compensation: $2,400—$2,520—$2,640—$2,760—$2,880—$3,000.

Associate petroleum engineer, annual compensation: $3,240—$3,360—$3,480—$3,600—$3,720—$3,840.

Petroleum engineer, annual compensation: $4,140—$4,320—$4,500—$4,680—$4,860—$5,040.

Senior petroleum engineer, annual compensation to be determined by Congress.

Principal lines of promotion in each of the foregoing three divisions are from any given grade to the next succeeding grade.

STATUS OF PENDING MINING LEGISLATION

Bills That Have Reached Committee Stage

Subject of Bill	*Bill No.*	*Author*	*Present Status*
Silver in coins	*H. R.* 11,226	*McFadden*	*Before House Committee*
Met. Min. on Ind. Res.	*S.* 287	*Ashurst*	*On Senate Calendar*
Timber for mining purposes	*S. No.* 1	*Pittman*	*Passed Senate Oct.* 3, *before House Committee*
Anti-dumping	*H.R.* 10,918	*Fordney*	*Passed House Dec.* 9, *before Senate Committee*
Laboratory glassware	*H.R.* 7,785	*Bacharach*	*Passed House Aug.* 2, *on Senate Calendar*
Magnesite	*H.R.* 5,218	*Hadley*	*Passed House Aug.* 7, *on Senate Calendar*
Tungsten	*H.R.* 4,437	*Timberlake*	*Passed House Aug.* 21, *before Senate Committee*
Zinc	*H.R.* 6,238	*McPherson*	*Passed House Sept.* 2, *before Senate Committee*
War Minerals Relief Amendment	*H. R.* 13,041	*Garland*	*House Committee has voted to report favorably*

NEWS BY MINING DISTRICTS

ALASKA

Aniak.—Due to labor shortage the new plant erected last summer at the Parks' quicksilver mines, 15 miles above Georgetown on the Kuskokwim River, could operate only part time during the winter and the production of mercury was small.

The first dredge installed on the Kuskokwim River operated fifty days during the season of 1919, and produced about $300,000 in gold. Delays in operations were caused by installing new machinery.

The shaft on the Nixon Fork gold quartz mines, Kuskokwim River, is down 65 ft., with a 25-ft. crosscut. The values are increasing with depth and are now $2,000 per ton of ore. The erection of a plant including a steam hoist and air compressor is under way. It is estimated that 1,500 tons of ore will be ready to ship by July, 1920.

Two other quartz claims are being developed in the same region, one belonging to George Whalen, the other to Pearson and Mespelt. A power drill outfit is prospecting on Ophir Creek, a tributary of the Kuskokwim, 150 miles above Bethel.

Thomas Riggs, Jr., Governor of Alaska, in his report to Washington, D. C., gives out figures showing that during the last fiscal year Alaska cost the National Treasury $7,665,285. During the same period the Federal Treasury received from Alaska $17,676,071, or $10,000,000 over expenditures. This is about $350 per capita for every white person in Alaska. Alaska produced 284 fine ounces of metals of the platinum group last year, valued at $36,600.

ARIZONA

Diamond Drilling Resumed on Ray Boston Property—Bagdad Being Reopened —Operations near Prescott

Kelvin—The mill of the Gila Development Co. has closed down until a new pump can be installed. During operation the mill proved highly efficient and satisfactory, making a good recovery and handling a large tonnage. A modern pump will be installed immediately to furnish water.

Diamond drilling has been resumed on the property of the Ray Boston Copper Co., formerly the Kelvin Sultana Copper Co. The work is being done under contract by the Pennsylvania Drilling Co., with two large rigs, operating three shifts.

Globe—A recent strike on the 600-ft. level of the Superior & Boston is considered of importance as it proves the continuation of the foot-wall vein both vertically and longitudinally. The strike on the 600-ft. level was made several hundred feet east of the drift on the 400-ft. level. The first seven feet of ore cut by the new crosscut ran 10 per cent copper and well in silver. As opened on the 400-ft. level this oreshoot was from 7 to 14 ft. wide. Shipments from this level are more than meeting operating expenses.

Canon—The Arizona Tiptop Mines Co. has recently purchased a 500-ft. compressor and drills from the Chicago Pneumatic Tool Co. The equipment will be shipped out by truck from Phoenix as soon as the roads are sufficiently repaired to be used. Other improvements are being made in the mining equipment and it is planned to start operation late in March. J. F. Coupal is in charge.

Hot Springs Junction—Shipments of high-grade lead ore carrying small amounts of silver continue from the Arizona lead-silver mine of the E. Payme Palmer estate. The property is being explored from the bottom of the original shaft and new ore has been found under the old glory hole. Development is under the supervision of A. L. Flagg, consulting engineer, with J. H. Atchison in charge.

Tucson.—An interesting development connected with the rise in the price of silver has been the shipment to El Paso at a profit of very low-grade ores from the waste dumps of a number of old mines in southern Arizona. A substantial net return came from a 50-ton shipment taken without sorting from a dump of the Old Mission group, five miles southwest of Tucson, though it averaged only 7 oz. silver to the ton, with some copper.

Development at one point on the Sunshine group, 35 miles southwest of Tucson, in the Sierritas, is said to have cut 10 ft. of ore sampling 15 per cent lead, 15 oz. silver and $1.20 gold. In another crosscut is 20 ft. of commercial ore. S. W. Purcell, in charge, is moving the mine camp from Purcell to Sunshine.

In the Sombrero Butte, near Mammoth, development on the 300 level has found the ore changing to chalcopyrite, a very satisfying condition. A large compressor will be added to the surface equipment. Frank T. Pomeroy, of Mesa, is secretary.

The Lowell gold property in the Quijotoas has been leased for three years to W. Stephenson. The mine has a Chilean mill. In the same section, Ed. S. Scott has taken over the Ives-Perry mine.

Hillside.—H. A. Geisendorfer, former manager of the mines of the Bagdad Copper Co., 40 miles west of Hillside, has taken charge again, coming from Pioche, Nev. Preparations are being made for development of orebodies proved by drilling. Surveys are being run for possible railroad construction to one of three points, namely, Date Creek, south of Hillside; Bouse, on the Arizona & California line, and Seligman, on the Santa Fe main line. New buildings are being erected at the camp and much work is being done on roads. Transportation at present is by motor trucks.

Prescott—At the annual meeting of the Silver Belt Consolidated the officers elected were: President, John J. Mahoney, San Francisco; vice-president, R. H. Burmister, Prescott; secretary-treasurer, H. J. Mahoney, San Francisco; manager, Benjamin Rybon, Prescott. The company owns eight claims 2 miles west of Humboldt. The new shaft is 300 ft. deep. The ore vein is 6½ ft. wide with milling ore averaging $30 in silver and lead and shipping ore averaging 100 oz. silver and 20 per cent lead. The property produced about $500,000 under former owners. H. H. Burt, consulting engineer of the company, advises the installation of a 50-ton flotation mill. It is estimated that 21 carloads of shipping ore is in sight.

The following have been elected officers of the Yaba Copper Co. at the annual meeting: President, Capt. John Ericson, San Francisco; vice-president, A. J. Carroll; secretary and treasurer, Col. J. B. Dudley, San Francisco. H. H. Burt, consulting engineer. Extensive development is under way. The property is located two miles northeast of the Arizona Binghamton mine, at Stoddard. High grade silver-copper ore has been shipped. A wagon road from the mine to the main highway running to the shipping point at Dewey has been built.

The new truck road from the Franco-American mine to Dewey has been completed and shipment of several cars, now on the dump, will be made to the Hayden smelter. Col. Fred W. Bowler is president and manager, and J. E. Russell, of Prescott, secretary-treasurer. The mine has been a producer of high grade. It is located 1½ miles northeast of Stoddard.

The Peak Silver Mining Co., newly organized, has taken over seven claims 2 miles north of the old Peck and Swastika silver mines, 9 miles southwest of Mayer. J. E. Pierson, Prescott, is president, Gordon Clark, Prescott, vice president, B. K. Cavanaugh, Canandaigua, N. Y.. secretary, and W. J. Mayer, Mayer, Ariz., treasurer. The company has begun extensive development of the property for silver and copper.

W. H. Worthington, representing Eastern capital, has erected a 15-ton flotation mill at the old Monte Cristo silver property on Groom Creek. Old workings have been cleared to the 300-ft. level and considerable milling and shipping ore has been opened. Old stopes filled with 15 to 30 oz. silver ore, left by former owners, will be milled. It is estimated that this small unit will pay for all future development of the property and for the property itself. An extraction of 90 to 95 per cent will be made in the mill.

The NC 4 Silver Mining Co., is developing thirteen claims on the Hassayampa River, 9 miles southwest of Prescott. This is an old property with

over 4,000 ft. of old workings. The Ruby Silver claim has produced about $45,000 with silver at 62 cents, the Lucky Spot claim, $20,000. A shaft is being sunk 300 ft., and is now in good ore. On the Whale claims, a body of gold-silver ore 80 to 100 ft. wide, has been exposed, averaging $6. Two old ore dumps of 1,500 and 12,000 tons of milling-grade silver ore, are to be milled. A new hoist is to be installed. Officers of the company are: President, William Miller; secretary-treasurer, Eli Perkins; vice president, Charles Bradbury; consulting engineer, W. W. Lewis, all of Prescott.

At the 4th of July mine E. A. Meagan, O. R. Brock, O. R. Harris and W. H. Blocuit are installing a 3-stamp mill 5 miles southeast of Prescott. A shaft 105 ft. deep is in silver ore of milling grade averaging 35 oz. The property is under bond and lease.

Wm. P. Lemley, representing Pittsburgh capital, has taken over the Gold Bond property 15 miles south of Prescott. Richard L. Smith, of Pittsburgh, is the consulting engineer.

Mineral Park—F. E. G. Berry, vice-president and general manager of the Mineral Park M. & M. Co., announces that work will be resumed at once at the Washington mine, both underground and in the mill. Equipment at this property is complete, including a 25-hp. electric hoist, 20-hp. air-driven hoist, 700-cu.ft. electric-driven compressor, air drills and a 150-ton flotation plant. The mill equipment consists of a crusher, ball mills, classifier, thickener, filter, and pneumatic cells. The mill was built in 1917 and reconstructed in 1918. During 1919 about 600 tons of ore was treated with satisfactory results. The recovery of silver was 88 per cent, and gold 97 per cent. Concentrates shipped carried 115 oz. of silver with some gold. Original development of the property is by adit and winze to the vein where a good grade of milling ore was extracted. A main working shaft has been started and is 96 ft. deep. Present plans are to deepen the shaft to 120 ft., to cut a station at the 100 level and to drive to the winze workings. Sinking will then be resumed in the shaft. During sinking operations ore will be taken out through the winze and adit. It is hoped to have the mill running within the next sixty days.

ARKANSAS

Nakomis Mine at Dodd City Sold—Rich Strike at Big Hurricane Zinc Mine

Pindall.—J. C. Shepherd, who is operating the Big Hurricane zinc mine, a carbonate producer, has found the largest body of free ore yet encountered on the property. The ore is almost free from gangue.

Yellville.—E. J. Willhite, of O'Fallon, Ill., has closed a deal for the Nakomis mine situated at Dodd City, in Marion County, Ark. The property has been thoroughly prospected with drill holes and two shafts. Three well defined blanket veins of ore were cut.

CALIFORNIA

Gas from Argonaut Shuts Down Kennedy Shaft—Idaho Maryland Shaft Dewatered

Jackson—As an aftermath to the fire in the Argonaut last spring carbon dioxide gas appeared on the 3,300 level of the Kennedy in such quantities that the men were all ordered out of the mine and the shaft closed on March 7. Chief Mine Inspector G. Chester Brown is now making an inspection.

Grass Valley—Dewatering of the 1,000-ft. shaft of the Idaho Maryland has been completed. It is reported that it will be deepened to 2,500 feet.

Randsburg—One carload (38 tons) of ore from the California Rand shipped to Selby returned $52,750, an average of $1,400 per ton. This was almost entirely in silver.

Redding—The Afterthought Copper Co., at Ingot, has shut down all work on the Afterthought mine, and has pulled the pumps. It is cleaning up preparatory to closing the reverberatory furnace and oil flotation plant. It has not been announced how long the shutdown is to last.

COLORADO

Rawley Properties Near Bonanza Taken Over by Utah Leasing Co.—To Reopen Mickey Breen at Ouray

Bonanza—The Utah Leasing Co., a subsidiary of the Western Metals Co. of Salt Lake City, has taken over the Rawley properties near Bonanza, in Saguache County, Col., and will operate the mines on an extensive scale. A 700-ton concentrator erected at Midvale, Utah, is being dismantled and shipped to Shirley, where it will be connected with the mines by a 7-mile tramway. The mines are developed by a 6,000-ft. tunnel with a 1,200-ft. upraise to the surface and with numerous levels and drifts, which disclose large bodies of ore running well in silver, gold and copper. It is estimated that upwards of $250,000 will be spent in construction, equipment and development and that the greater part of the year will be required to get in full commission.

Ouray—The old Mickey Breen is the next mine to receive attention here. This is a well known old property, with a history; its principal veins are the Mickey Breen, Consort and Monarch, all of which show silver ore of shipping grade and a very good silver-lead milling ore. The showing is generally considered good because the work of various operators, including that of many lessees, has resulted in the driving of a number of drifts at several levels, by which considerable milling ore has been developed, and because it has a mill on the property. Its recent history has not been one of success, because operations have not been properly financed nor carried far, and the mill is not properly equipped. At present metal prices it seems that the mine can be made a producer if money can be provided to equip it and to remodel the mill, flotation being probably the chief addition necessary.

The property is now being promoted by J. Edie Stewart, of Ouray, who is organizing the Loyal Mining & Milling Co., a stock company. The stock will be sold in certain quarters where it is expected that $100,000 will be raised. The financing is still to be done, but it seems justifiable to mention this property as one which is apt to be in the market soon for equipment. It is the second large mine in the Poughkeepsie-Mineral Point section to get under way.

The Early Bird, at Mineral Point, has made a shipment of good silver ore but shut down to await spring.

The Golconda, just beyond Mineral Point, has sent up a new crew of men to reopen the property after the shutdown caused by the recent air receiver explosion and influenza epidemic.

E. R. Bauer and associates are attempting to work the old gold placers just below Ridgway; they are first trying out a new scheme of screening and treating on an Eggers differential jig.

IDAHO

Kellogg United Mill Nearing Completion—Day Interests Will Explore West Sunset Ground

Wallace.—The Kellogg United Mining Co., which has a lease on the Corrigan group of 38 claims, owned by the Federal Mining & Smelting Co., will have a 75-ton mill in operation this spring, according to present plans. The mill building is practically completed and the machinery is due for delivery in a few weeks. The property was extensively developed by the Federal years ago in the hope of finding a commercial body of lead-silver ore. The large amount of zinc found was discouraging at that time and work was suspended in 1910 after driving over 2,000 ft. of tunnel, sinking 600 ft. and exploring the ground on several levels. The new mill is designed to separate and recover both lead and zinc. It is about a mile from the railroad.

Work will soon begin on the West Sunset, formerly known as the Portland, now owned by the Days. The property joins the Sunset mine, upon which Senator W. A. Clark, of Butte, has sunk an 800-ft. shaft not far from the common end line of the Sunset and West Sunset. The Days have secured the right to use this shaft, from which the West Sunset ground will be explored. The limited development work by tunnel has exposed considerable lead and zinc ore. The property is on the famous Sunset vein, upon which Senator Clark has developed much low-grade ore in the Sunset mine.

Murray—The Paragon Mining Co., which owns a large group of claims near Murray, has purchased the entire holdings of the Murray Hill Mining Co. adjoining, the purchase including a mill of 150 tons capacity. The Paragon has developed a large body of lead and zinc ore, and has a record of shipping thirty carloads of zinc concentrates and six cars of lead, having the joint use of the Murray Hill mill.

MICHIGAN

Mohawk Stops Work at No. 1 Shaft—Arcadian Con. Expects To Resume Work by April 15

Mohawk—Mohawk has suspended operations at No. 1 shaft, which was reopened a month ago. The decision not to continue this work was reached because of the difficulty in getting men. Sinking continues at No. 4 and at No. 6 shafts and the rock tonnage for the whole mine is averaging 1,800 daily. A second battery locomotive has been added at No. 6 shaft. Improvement in regrinding at the stamp mills has reduced the tailings loss from 4.8 lb. to 3.6 lb. per ton. Further regrinding is expected to reduce the loss still more.

Hancock—Hancock Consolidated continues to explore the territory east of the main Pewabic lode. Operations have been somewhat hampered by influenza. At present ten machines are at work. Drifting on the No. 12 amygdaloid, cut in the crosscut from the 44th level, continues in fair ground in both directions.

Houghton—The Mayflower-Old Colony crosscut is in 50 ft. The management is continuing its work on the policy of opening this broken area without any unnecessary outlay by the shareholders. The crosscut is at a depth of 1,710 ft. and was started in the drift at a point 100 ft. from the shaft.

If conditions permit, operations at the Arcadian property will be resumed before April 15. On the 1,700-ft. level 80 ft. of drifting was done when operations were suspended in 1918 and some good ground was opened. Crosscuts totaling 310 ft. in length were driven on this level and 112 ft. on the 1,850-ft. level.

The Calumet & Hecla recently announced that the directors would declare no dividend for the current quarter.

Winona has 125 men at work underground. The 140-ft. crosscut from the 15th level of No. 4 King Phillip to Winona No. 1, to provide better ventilation, has been completed and the sump is being cut. Following this the upraise will be started. The crosscut was 140 ft. long. Stopes in No. 4 King Phillip are showing well, but no large increase in production can be secured for some time, owing to scarcity of men.

Gogebic Range

Ironwood—At the Eureka mine, No. 3 shaft is shut down for repairs, which will include installing some steel sets and heavier rails in the skip roads, and the renewal of the blocking throughout the shaft.

The McKinney Steel Co.'s new general office for the Gogebic Range has been erected at the Ironton mine. A new engine house is also being built for the Corrigan shaft, where electric hoists and a compressor will be installed. This mine probably has the largest ore reserves in sight of any mine on the range, but it has not yet entered the ranks of large producers. A few years ago its prospects were not thought to be good, but recent developments indicate a big future for it.

Menominee Range

Iron River—All mining operations have been suspended temporarily at the Bangal mine until necessary repairs can be made to the shaft, which is to be concreted from the collar to the ledge, a distance of about 150 ft. It is expected that the work will require about two months.

MONTANA

Butte—The Anaconda Copper Mining Co. is suffering from a lack of experienced miners and in consequence was compelled to suspend mining operations at the Silver Bow and the Bell and Diamond shafts, the men at these properties being sent to other mines to help fill up the shifts. Because of this situation fireproofing of the Bell and Diamond shaft was begun. This is 300 ft. deep and is one of the deepest to be "gunnited" with cement. Raising of a third compartment at the Original shaft has been completed and this property will be in readiness to resume operations April 1.

Sinking of Butte & Superior's No. 2 shaft at the Black Rock mine is progressing at the rate of more than 100 ft. monthly. The objective is the 2,350-ft. level. An energetic program of development is under way.

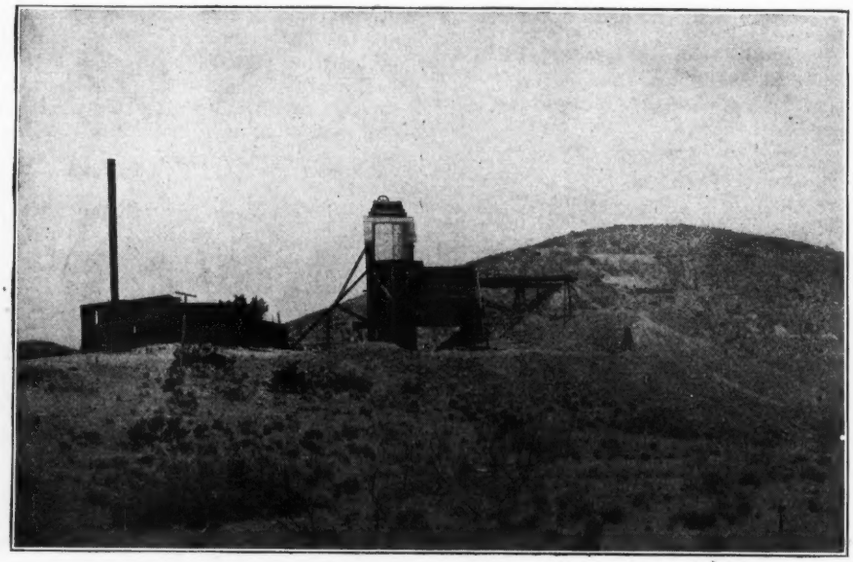
Ore shipments from the Butte Metals' Otisco property, just to the south of the Davis-Daly, are approximating 100 tons daily. This company was organized by the Hayden-Stone interests. Shaft sinking has begun at Mary Louis.

Elkhorn—The Boston & Montana Development Co. expects to reach the Park vein within two weeks. Drifting on the Blue Jay fissure shows a continuance of a good grade of milling rock. Mill construction is being pushed. More than 200 men are employed.

NEVADA

Louisiana Con.'s New Plant Ready Soon—Goldfield Development Levies Assessment—Nenzel Crown Point and Rochester Combined To Stay Out of Merger

Tybo—It is semi-officially announced that the mill and smelter of the Louisiana Consolidated Mining Co. at Tybo, 65 miles northeast of Tonopah, will be completed and in operation by April 1. The Tybo mine was a famous producer of silver, lead and gold in the 50's and 70's. Much of the ore now produced carries more or less zinc, but it is believed the present reduction plant will handle this. The electric transmission line from Belmont to Tybo, a distance of nearly 40 miles, was completed some time ago, and a telephone line was also run to the camp. This work has all been done since the property was put under the management of F. W. Draper, who has also opened up several new orebodies.

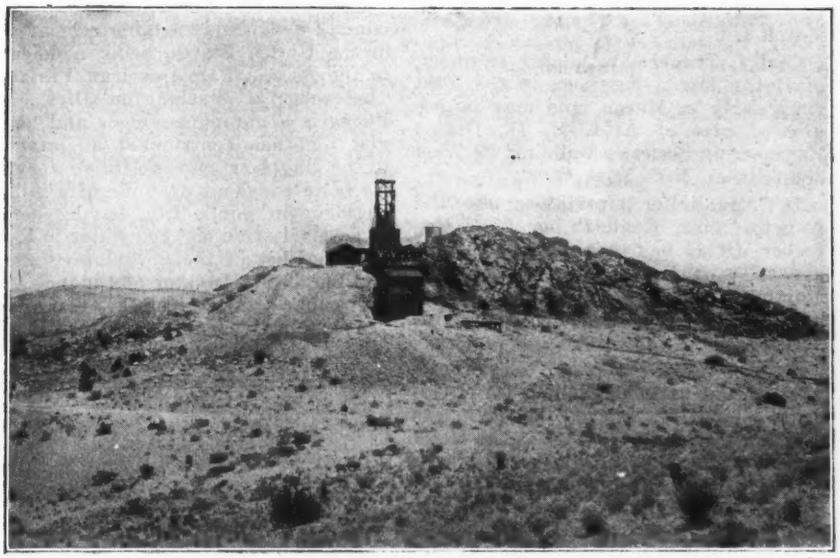


PLANT OF MISER'S CHEST MINE, LORDSBURG, N. M. A PRODUCER OF GOLD-SILVER-COPPER ORE. PROPERTY IS OPENED BY A 400-FT. SHAFT AND ADJOINS BONNEY MINE ON WEST

Goldfield—The Goldfield Development Co., which has a lease on the mines and mill of the Goldfield Consolidated Co., as well as some nearby properties, has levied an assessment of three cents per share, payable at once and delinquent Apr. 3, 1920. This comes as a surprise, as it was believed that the company was fully financed to carry out its plans, which included increasing the capacity of the Consolidated mill to 2,000 tons daily. However, the depressed market conditions upset the plans and the assessment resulted. The company's financial statement shows receipts from sale of stock, $107,487.03, and from loans, $36,000; total, $143,497.03. The expenses for mining were $71,789.78; construction and equipment, $12,252.01; mill repairs to date, $43,553.76; total, $127,302.80.

Rochester—A special meeting of the stockholders of Rochester Nevada Silver Mines Co. will be held at Reno on

March 22, to elect a board of directors for the ensuing year. The annual report is ready for distribution. The authorized capitalization will be materially reduced, as it has been decided that the Nenzel Crown Point Mining Co. and the Rochester Combined Mines Co. will not be taken into the consolidation as was originally proposed—at least at this time. Under the terms of the consolidation the parent company will issue seven thirty-seconds of its capital stock in exchange for all the issued and outstanding stock of Rochester Mines Co.; four thirty-seconds for the stock of the Rochester Merger Mines Co.; and two thirty-seconds for that of the Rochester Elda Fina Mining Co. The new company takes over all the rights, assets, etc., of the three companies taken into the consolidation and, of course, also assumes their liabilities. It is claimed that the physical condition of the properties is better than for some time past.



ATWOOD COPPER PROPERTY, LORDSBURG, N. M. MAIN SHAFT 350 FT. DEEP

Yerington—The Walker River Copper Co., J. E. Gelder, manager, has received a new Traction Star drill to be used in testing its ground to a greater depth. It is announced that considerable development work was decided upon following the recent visit and examination by R. M. Atwater, Jr., of Ladenberg, Thalman & Co., of New York, and W. Murray Sanders, consulting engineer of the company. Satisfactory results have been secured in experimental work on a leaching process and preparations are being made to install a 50-ton plant. Electric power will be secured by running a branch line from the main line which goes to the Thompson smelter.

The Bluestone Milling & Smelting Co. has laid off practically all of its miners and carpenters, the few men left being engaged in cleaning up about the mine and mill. The Bluestone has but recently completed the second unit of its flotation mill, which increased the capacity to better than 800 tons. mill to handle the dumps is included in present plans.

NEW MEXICO

Lordsburg—The Co-operative Mining Co. has started its 60-ton mill and is making a satisfactory recovery.

Joe Hitchins has shipped one car this month of good copper ore from the Atwood property and will have another ready in two weeks.

February shipments from the Lordsburg district totaled 145 cars of ore valued approximately at $150,000.

Work has been started by M. M. Crocker on his lease upon the J. B. Foster claims which adjoin the Bonney mine on the south. W. Hughes is superintendent.

Tyrone—C. W. Mitchell, representing New York interests who have taken over the Cora Mitchell mine west of Tyrone, is to begin work at once. A

UTAH

Judge M. & S. and Daly West To Pay Dividends April 1, First for Latter in Seven Years

Park City—Iowa Copper stockholders have taken enough treasury stock to pay off the present indebtedness as well as to provide funds for new machinery and development during the next three months. The 200-ft. level, where a promising fissure has been cut, will be given especial attention.

The Judge and the Daly West, the latter now under the same management as the former, will pay dividends on April 1, the Judge paying 12½c. a share or $60,000 and the Daly West $37,500, this being equal to 15c. a share. The dividend by the Judge brings the total to $2,370,000. The Daly West is paying its first dividend in seven years; it has a record of $6,643,000. The Daly West has been extensively developed during the last two years, and on Jan. 1 had a cash balance of $142,000. One orebody opened in new ground above the 1,200-ft. level of the adjoining Judge mine is stated during the last two months to have produced on an average $1,000 a day, the value per ton of the ore having exceeded $100. The ore from this property is silver-lead-zinc, the principal value being in silver. January and February earnings will be almost sufficient to furnish dividends for the next six months. The new ore gives evidence of occurring in large bodies. On Jan. 1, the Judge Mining & Smelting had a cash balance of $148,000 and unsold zinc amounting to $135,000. January earnings amounted to about $45,000. Orebodies are holding out well, with excellent reserves, it is stated. The company has on hand 3,500 tons of zinc concentrates, which, at the present rate of production, will keep the electrolytic zinc plant running for a year. The production of the latter is being increased to the maximum output of 12 tons of zinc running as high as 99.9 per cent pure.

MEXICO

Chihuahua

Parral—The Alvarado Mining & Milling Co. is reported to be planning to double the capacity of its mills. The present plant has a capacity for treating 600 tons of ore a day. Knauth, Nachod & Kuhne and the Mexican International Corporation are, it is understood, acting as bankers for the company and shortly will offer a block of common stock for subscription, the proceeds of which will be used for the enlargement of the mill and other improvements. Those improvements will be completed early in 1921.

Hidalgo

Pachuca—Forty-two of the 136 miners who were caught in the main shaft of the El Bordo mine at Pachuca, Hidalgo, were unaccounted for late on March 11, thirty-six hours after fire had broken out in the shaft. The mine was sealed on March 11 for a period of twenty-four hours to smother the flames, it being intended to open it the following day.

Sonora

Tonichi—Buildings of the Chicago Exploration & Development Co., 45 miles northeast of Tonichi were wrecked by dynamite about three weeks ago by renegades, according to a press dispatch from Agua Prieta. The report is attributed to Franklin B. Harding consulting engineer for the company, who said the loss is $125,000.

Jalisco

The Espada Mines Co. in the Hostotipaquillo district is operating on one-third time on the ore dump. It is repairing the tramways and expects to operate the mill to capacity on ore from the mines shortly. It reports that the situation as regards activities of bandits in that region is improving. E. L. Porch is president and Edward Thomas manager.

MEN YOU SHOULD KNOW ABOUT

M. K. Shaler may be addressed at 66 Rue des Colonies, Brussels, Belgium.

J. A. Reid, of the O'Brien mine, Cobalt, has gone to Mexico for a short trip.

Arthur W. Jenks, mining engineer, is in New York City in the interests of San Francisco clients.

F. P. Cavanagh, of Philadelphia, has been making examinations in the Lordsburg district, New Mexico.

Frederic R. Weekes, 233 Broadway, New York City, has left for Utah and Montana on professional business.

J. R. Crenshaw, mining engineer, Eagle Picher Lead Co., is now superintendent of leases for the company.

John Smeddle, of Oatman, Ariz., has left for Guanajuato, Mexico, where his address will be in care of El Cubo Mining & Milling Co.

J. B. Tyrell, of Toronto, Canada, has been retained by the National Mining Corporation of London, as one of its consulting engineers.

George A. Smith is making moving pictures of the Hollinger mine, Porcupine district, for the Ontario provincial government.

R. A. Bryce has returned to Toronto from Barkerville, B. C., where he has been developing gold properties on Proserpine Mountain.

W. J. Olcott, of Duluth, president of the Oliver Iron Mining Co., is spending a few weeks' vacation in California.

Theodore Simons, professor of mining in the Montana School of Mines, was elected chairman of the Montana Section, A. I. M. E., at its annual meeting.

Daniel C. Roper, of South Carolina, Commissioner of Internal Revenue, who recently resigned his office, will be remembered with regret by those representatives of the mining industries who had occasion to confer with him recently concerning mining taxes. They have been impressed wih his ability and fairness.

C. E. Julihn has been designated as district engineer for the U. S. Bureau of Mines for the Lake Superior district. This is to be in addition to his duties as superintendent of the Lake Superior experiment station of the bureau.

John Seward has resigned as general manager of Butters Divisadero Co., Divisadero, Salvador, and returned to the United States. His present address is No. 55, "The Enclosure," Nutley, N. J.

H. M. Motherwell, safety engineer with the Pennsylvania Bureau of Mines, has been selected to head the Mine Safety section of the Safety Congress to be held in Harrisburg, March 22-27.

Rudolf Kudlich, mechanical engineer, Pennsylvania Bureau of Mines, will attend the Safety Congress held by the Pennsylvania Department of Labor and Industry, at Harrisburg, Pa., March 22-27.

Donald F. Hewett, of Washington, D. C., is in Cuba on an expedition of one or two months, connected with the geological investigation of certain deposits in the eastern portion of that island.

E. E. Grant, of Chicago, executive secretary of the Independent Oil Men's Association, was in Denver early in March arranging for the Association meeting to be held there Sept. 28 to Oct. 1.

B. O. Pickard, who has been in charge of the U. S. Bureau of Mines station at Houghton, Mich., has been transferred to the California station. He was given a dinner at the Houghton Club on March 4.

Carl J. Trauerman, mining engineer, of Butte, Mont., has been in the East since early in March, and may be addressed care of A. I. M. E., United Engineering Societies Building, 29 West 39th Street, New York City.

D. C. MacKeller, superintendent of the Annetta mine, Eagle-Picher Lead Co., Picher, Okla., has been made assistant general superintendent of mines, and **Martin Ritter,** mining engineer, takes his place as superintendent of the Annetta.

Ralph Arnold, of Los Angeles, chairman of the national Hoover-for-President committee, opened headquarters for New York and the East in the Hotel Pennsylvania, New York City, on March 12. F. W. Dowing is temporarily in charge.

Waldemar T. Schaller, chemist in the Division of Physical and Chemical Research, United States Geological Survey, has resigned to accept a position with the Great Southern Sulphur Co., Inc., of New Orleans, La., operating at Orla, Texas.

H. L. F. Blake, explorer and mineralogist, has left Quebec with a party to explore the Ungava region of northern Quebec. The expedition is in the interests of a wealthy British syndicate planning to develop the mineral resources of the region, and will not return until October.

George L. Nye, special counsel for the American Mining Congress, left Denver for New York March 20. He will appear for that organization before the commissioner of the Federal Trade Commission, at a hearing commencing March 24, to receive testimony in proceedings instituted against the Minerals Separation Co., Ltd.

John D. Galloway, formerly with the Department of Mines of British Columbia and recently with the Doherty Operating Co. of New York, has resumed his former duties as district mining engineer of Mineral Survey Dist. No. 2. His headquarters are at Hazelton, B. C. While with the Doherty Co. he was sent to Mexico.

Van. H. Manning has not resigned as Director of the U. S. Bureau of Mines to take a position with the National Petroleum Institute, as published in a Chicago petroleum journal. Dr. Manning's name has been mentioned in connection with the research work which may be undertaken by the National Petroleum Institute.

H. C. Smith, formerly superintendent of the Utah Copper Co.'s Magna mill at Garfield, Utah, has been appointed superintendent of Ray Consolidated Copper Co.'s mill at Hayden, Ariz. He succeeds D. D. Moffatt, who was recently made consulting engineer in charge of all the mills belonging to the Jackling interests. Mr. Smith recently accompanied L. S. Cates, assistant general manager of Utah Copper Co., and Mr. Moffatt on a tour of inspection of the properties in the Hayden district.

Fernando C. Fuchs, Peruvian Minister of Finance, is making a brief stay in the United States, being a delegate to the Second Pan-American Financial Conference at Washington, D. C. Mr. Fuchs is a mining engineer and geologist and has contributed at intervals to the *Engineering and Mining Journal.* He is an excellent example of a mining engineer in public life, having served successively as a city councillor in Lima, as a member of the Peruvian congress, and finally as Minister of Finance. All his public service comes after many years of active experience in directing mining operations.

OBITUARY

John J. Pearce, locator of the Commonwealth ledge, and after whom Pearce, Cochise County, Ariz., was named, died of influenza at Oakland, Cal., at the end of February. The Commonwealth mine closed down permanently in 1917.

L. A. Snyder, a mine manager with experience in Nevada, Arizona, California, New Mexico, Mexico, and Central America, died of influenza at Ely, Nev., on March 5, in his 66th year. During the past three years Mr. Snyder had been in charge of the Siegel mines at Schellbourne, Nev.

SOCIETIES

The Pennsylvania State Safety Congress will meet at Harrisburg, Pa., in the State capitol during the week March 21-27. The congress has been called by C. B. Connelly, Commissioner of Labor and Industry, with the avowed object of working out "A practical program for industrial safety that will touch every industry in the Commonwealth." Among the prominent persons expected to address the congress are C. M. Schwab and Samuel Gompers.

COURT DECISIONS IN MINING CASES

By Wellington Gustin

Claims Under Federal Coal Land Act Construed

Mortgage May Provide for Satisfaction Out of Lands—Relinquishment of Claims Sufficient Consideration

In the case of George Weikel and others against Syrenus A. Davis and others, involving coal-land rights in the State of Washington, it appears that these parties entered upon and improved certain coal lands in Lewis County, Wash., long prior to the Government survey thereof. The survey showed that the filings and claims of plaintiffs seriously conflicted with those of defendants. The former made individual claims and filings; the latter claimed and filed collectively as an association, which under the coal-land laws entitled them to 320 acres. Pending a hearing to determine the preference rights of the parties, they got together and executed a written agreement to avoid the uncertainties of litigation, as the instrument recited. By its terms, the plaintiffs agreed for a consideration of $27,000 to withdraw all their claims to the lands, to relinquish their rights to the United States Government, and to lend their assistance to aid defendants to obtain patent from the Government, and that after issue of this Government patent the defendants were to give plaintiffs a first lien upon the lands to secure payment of $26,000 and interest, the instrument to distinctly state that the defendants should not be personally liable for any part of this payment.

Thereafter defendants received patent on 320 acres of the coal lands as an association, and mortgage covering the land was executed and delivered. By terms of mortgage the mortgagees were to look exclusively to the land for reimbursement. Later, the defendants being in default on the mortgage, this action was brought to foreclose the mortgage. The trial court dismissed the action, and the plaintiffs appealed.

Now, 2347 and following sections of the U. S. Revised Statutes regulate the entry and acquiring of coal lands. They provide that any citizen above the age of twenty-one years, or any association of persons severally qualified, may enter a quantity of vacant coal lands of the United States, not exceeding 160 acres to such individual person, or 320 acres to such association.

On the appeal, the defendants contended the instrument was not a mortgage, because the mortgagors did not become personally liable under the mortgage. But the Supreme Court of Washington held this to be unnecessary. Again, the contention was that the withdrawal of claims to the contested mineral lands, and the relinquishment to the Government, was an insufficient consideration for either the original contract or the mortgage; but again, the court said, the plaintiffs released, and respondents received, valuable rights, and this was a valid and sufficient consideration.

The defendants further contended the original contract and the mortgage were void because they were in violation of the Federal Coal Lands Act and against public policy.

But the defendants contended the instrument sought to be foreclosed was not a mortgage at all, but an agreement, conceived in fraud, whereby defendants were to acquire the coal lands for the plaintiffs, thus giving them more lands than they could lawfully acquire under the Coal Land Act; that the whole business was a conspiracy and fraud to defeat the Government. On this angle of the case the court found the facts did not substantiate the contentions.

Therefore the judgment was reversed, with instructions to foreclose the mortgage.

Damage to Lands by Muck and Rock From Ore Washers

Plaintiff recovered damages for injury done to his land by defendant's maintenance and operation of ore washers situated on its land above plaintiff's land and property.

Defendant showed that the polluted waters had been carried down on plaintiff's land for ten years previously without complaint, and by his acquiescence, and therefore he was now estopped to set up claim for damages. But the damages claimed were for injury for the year next preceding the suit, and the court held the action was not barred, being different from other like injury, acquiesced in by plaintiff, during the preceding ten years.

Where the evidence went to show damages from the crop destroyed, and the defendant company asked for an affirmative charge to be given to the jury, on the ground that the proper measure of damages for temporary injury to lands is the difference in rental value of the land plus the expense of restoration, a point to which no evidence was addressed in the suit, this charge was properly refused, the court held. But where the testimony in the case detailed the injuries to the land and stated its value before and after, leaving the jury to infer the damages to be assessed, the court held that it was properly admissible. If plaintiff's land was damaged solely by the acts of defendant in depositing water, muck, and rock from an ore washer, defendant was responsible for the whole of the damage—Tennessee Coal, Iron & R. Co. vs. Bunn, Supreme Court of Alabama, 79 So. 360.

Kennedy Oil Co. Denied Relief in Suit Against Meyers

Court Refuses To Recognize Performance of Contract Through Organization of Unincorporated Company

In West Virginia a suit was brought in Kanawha County by W. A. Kennedy, H. C. Nease, G. N. Hancock, M. C. Barger, M. A. Boland, S. B. Thomas, and C. J. Van Fleet against L. D. Burns, G. W. Stage, Samuel H. Meyers, and A. C. Lawrence, to compel specific performance of a contract or option, made between Meyers and Kennedy and Van Fleet, July 18, 1918.

It appears that Meyers was the lessee of an oil and gas lease in Kanawha County, and he gave an option or contract to Kennedy and Van Fleet, providing that the latter were to have "the exclusive right for a period of sixty days" "to organize a company and take over to such company" the lease, and upon organization of said company the lease was to be so conveyed in consideration of the issue to Meyers of one-sixteenth of the stock issued.

Kennedy and Van Fleet were to raise a sufficient amount to equip and drill one well on the premises to the Berea sand, or to its estimated depth. No company was incorporated, but Kennedy and Van Fleet sold fractional parts, or interests, in the lease to certain other individuals with whom they associated themselves, and formed an unincorporated company under the name of the Kennedy Oil Co.

That company issued certificates of shares in the leasehold to each member. Three of the plaintiffs engaged A. C. Lawrence to drill a well. The latter was to furnish all necessary funds and was to have fifty shares of stock and to be reimbursed to 62½ per cent of his outlay if the well proved productive.

The company issued a certificate to Meyers, certifying he was the owner of "shares of the Kennedy Oil Co., full paid and non-assessable," and further stating that the owner was entitled to one-sixteenth of all dividends.

The certificate, together with a form of deed intended to be executed by Meyers, conveying his interest in the lease to W. A. Kennedy, was presented to said Meyers. He declined to accept it or to execute the deed, on the ground that the condition of the option or contract had not been complied with; that the formation of a corporation was the only kind of a company contemplated. Action to enforce specific performance of the option contract was then begun. The Court of Common Pleas decreed the performance, but the Circuit Court reversed this decree and dismissed the case, and the Supreme Court of Appeals of West Virginia has affirmed this decision of the Circuit Court.

THE MARKET REPORT

Published in part in San Francisco and mailed from there to our Western subscribers as a special service pending the arrival of the *Engineering and Mining Journal*

Silver and Sterling Exchange

March	Sterling Exchange	Silver		March	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
11	380	121	69⅞	15	365	117½	70¼
12	370	117	70	16	370½	118	67⅞
13	368¼	117	70⅛	17	373	121	65¾

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

Daily Prices of Metals in New York

March	Copper	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
11	18.10@18.20	62½	63½@64	9.25@9.50	9.00@9⅛	8.60@8.70
12	18.10@18.20	62	63	9.20@9.45	8.95@9⅛	8.60@8.65
13	18.10@18.20	62¼	63 @63½	9.15@9.40	8.95@9⅛	8.55@8.65
15	18.00@18.10	61½	62½	9.10@9.35	8.95@9⅛	8.50@8.55
16	17.95@18.05	61	61½@62	9.00@9.30	8.90@9.10	8.45@8.50
17	17.90@18.00	60½	61 @61½	9.00@9.25	8.85@9.10	8.35@8.40

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other special shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis. Tin is quoted on the basis of spot American tin, 99 per cent grade, and spot Straits tin.

London

March	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3 M		Spot	3 M	Spot	3 M	Spot	3 M
11	108¼	111½	115	388	393	49¼	51¾	55	58
12	110	113¼	117	387¾	392¼	48½	50¾	55	58
13	....	....	...	....	....	...	...	...	...
15	108¼	111¾	117	383½	388	47⅝	49¾	54	57
16	107	110	117	372	377	45	47	53	54¾
17	103	106	116	358	363	42½	44½	51	53

The above table gives the closing quotations on the London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb.

Metal Markets

New York, March 17, 1920

A general tendency to decline featured the metal market during the last week, London apparently setting the pace in this regard. The upheaval in Germany caused less of a disturbance than might have been expected. But little metal has been purchased for German account, and political trouble in that country was anticipated.

Foreign money was in general steady, with slight increases in the value of sterling, marks, francs, and the Scandinavian units.

Transatlantic freights were unchanged and transpacific rates remained at $12 from Hongkong and Kobe to San Francisco.

Copper

Producers seemed anxious to sell during the preceding week, in order to prevent further piling up of stocks, and in the competition to market their metal, the price showed a declining tendency. Some of the smaller producers were unwilling to meet the drop, and early in the week were able to get up to 18¼c., but this does not represent the major market. In the neighborhood of 18c., the price proved very attractive for several large consumers who had been holding off for their second-quarter requirements, and total sales were greater than for some time. At least one of the big producers cut prices a shade under 18c. to tempt bargain hunters.

Brass makers are absorbing some of the Government's war stock of second-hand copper, which has also had a tendency to depress the market. However, the general sentiment is that it is unlikely that the price will drop much below 18c., for consumers realize that copper is very cheap at this figure, and producers will, no doubt, take steps to curtail production if forced to sell at a lower price.

Copper Sheets—No change in base price of 29½c. per lb. set early in January. Copper wire erratic, quoted 21⅞ @22c.

Tin

Spot tin has been quiet, and little business was done, due to the fact that the New York market was lower than the cost of export. A good business was done in futures, dealers and consumers being active buyers, particularly tin-plate manufacturers. A sharp drop in London yesterday was reflected to some extent here, although the local market was comparatively steady.

Electrolytic tin was quoted as follows: March 11, 64c.; March 12, 63¼ @63⅞c.; March 13, 62⅜c.; March 15, 61⅛c.; March 16, 61⅞c; March 17, 61⅞c.

Straits tin for future delivery is quoted as follows: March 11, 64¼@ 64⅜c.; March 12, 64@64⅛c.; March 13, 64@64⅛c.; March 15, 63@63⅛c.; March 16, 62⅜@63⅛c.; March 17, 62@62⅛c.

Arrivals of tin during the week have been: March 10, 70 tons from London and 75 tons from Liverpool; March 13, 25 tons from London; March 15, 35 tons from Singapore.

Lead

Lead declined during the week, along with other metals, and yesterday and today one producer was offering it at 9c. delivered in New York. Some small lots of metal for spot delivery were held at close to 9⅛c. early in the week, but buyers for the most part preferred to wait. A shipment of lead to New York found the market weak, and the price was progressively reduced to near 9c. to find buyers. Large consumers in the market for future delivery were inclined to stand off and see how far the drop would go before providing for their requirements.

One big feature which tended to weaken the market was the fact that lead could be bought in London for slightly under 8c. Large sellers had no hesitation in selling here for 9c. or better, with this fact in mind. Another factor is the improvement in producing and transportation conditions.

Zinc

The market has been declining during the week, and Prime Western grades sold down below 8¼c., St. Louis, following a steady drop on the London market, where the metal fell yesterday

from £57 to £54¾. Today, zinc was to be had in London at 8c., and in St. Louis at 8.45c. and under. Business here is dull owing to the fact that producers are not generally willing to accept current offers. Producers of high-grade zinc were pretty well sold out and were unwilling to meet the drop in Prime Western grades.

Zinc Sheets—$12.50 per 100 lb., less 8 per cent on carload lots.

Gold, Silver and Platinum

Gold was quoted in London as follows: March 11, 107s. 2d.; March 12, 112s. 1d.; March 13, 112s. 1d.; March 15, 112s. 4d.; March 16, 111s. 6d.; March 17, 110s.

Foreign Exchange—The news from Germany caused a violent fluctuation in the value of the mark and brought the price back to 1.11c. on Monday. Tuesday's dispatches predicting the continuance of the Ebert government in power, however, caused the rate to strengthen to 1.36c. Sterling yesterday showed unexpected strength again, closing at $3.73, and the predicted reaction from the sudden jump upward has not yet been experienced. Canadian exchange is about the same, the New York discount being from 11 to 12 per cent. Tuesday's quotations in units to the dollar were: Francs, 13.40; lire, 18.12. In cents to the unit: Japan, yen, 46.25; Argentina, 101.90; Brazil, Rio, 27.75; Austria, kronen, 0.43.

Silver—The London market closes weak and lower at 65⅞d., due to pressure of Continental selling. Shipments of coin from France and Germany are being melted down and sold in the London market, and with lack of any India demand this supply is more than sufficient to take care of local needs in London, with the result that silver has recently been shipped from London to New York to take advantage of the higher price for silver prevailing in this market.

While this movement has not been large, it is nevertheless indicative of the situation. Our New York market the past week has held around $1.18, due to renewal of China demand, and also to lack of any pressure to sell by producers in this country. The inability of buyers and sellers to get together on a price has resulted in a small business being done the past week.

Mexican dollars at New York: March 11, 92⅝; March 12, 89⅜; March 13, 89¾; March 15, 89¾; March 16, 90⅝; March 17, 91⅜.

Platinum — Market dull, $135@$140 per oz.

Palladium—$130@$135 per oz. No movement.

Iridium—Quoted at $300. Scarce.

Other Metals

Aluminum—Ingot 33c. per lb. Market firm.

Antimony—Demand fair. Ordinary brands quoted 11@11½c. with futures at 11½@12c.; W. C. C., 11½c., and Cookson's spot, 14¾c.

Bismuth — Unchanged at $2.50 for 500-lb. lots.

Cadmium — Unchanged at $1.40 @ $1.50 per lb.

Nickel—Ingot, 43c.; shot, 43c.; electrolytic, 45c. Unchanged.

Quicksilver — Increased demand. Quoted at $93@$95 per 75-lb. flask. San Francisco telegraphs $85 strong.

Other Ores and Minerals

Pyrites—Spanish pyrites is quoted at 16c. per unit for furnace-size ore, free from fines, c.i.f., Atlantic ports.

Iron Ores—Lake Superior ores, per ton delivered at Lower Lake ports, are as follows: Old Range bessemer, $7.45; Old Range non-bessemer, $6.70; Mesabi bessemer, $7.20; Mesabi non-bessemer, $6.55. The following are the Port Henry base prices: Old Bed furnace ore, $5.80 per long ton; Old Bed concentrates, 63 per cent, $6.75; Harmony cobbed ore, 63 per cent, $6.70; New Bed low phosphorus, 65 per cent, $9.50; lump ore for fix, $7. Most of the Eastern iron ore output for 1920 has been sold.

Sulphur—Practically no change has taken place in the situation of this mineral.

Chrome Ore—Quoted 70@75c. per unit for 48 per cent material.

Molybdenum Ore—Little movement in the market. Nominal price remains at 75c. for 90 per cent concentrates.

Tungsten Ore—The market is very quiet with prices ranging from $6 to $6.50 per ton for Chinese ore.

Graphite — Present quotations for crucible flake are: 86 per cent, 8c. per lb.; 88 per cent, 8½c. per lb.; 90 per cent, 9c. per lb.; 92 per cent, 9½c. per lb. delivered. The only changes are those due to the fluctuations of foreign exchange which effect import shipments.

Uranium Ore (Carnotite) — $2.75@ $3 per lb. of 96 per cent U_3O_8, minimum 2 per cent U_3O_8.

Vanadium Ore—$6 per lb. of 99 per cent V_2O_5 contained.

Ilmenite—2c. per lb. of 52 per cent TiO_2.

Rutile—11c. per lb. of 95 per cent TiO_2.

Feldspar—Quoted nominally at $13.50 @$18, f.o.b. New York.

Fluorspar—Acid-grade, lump, $30@ $45 per ton; ground, $52@$57 per ton. Gravel, $25 per net ton.

Zinc and Lead Ore Markets

Joplin, Mo., March 13—Zinc blende, per ton, high $55.10; basis 60 per cent zinc, premium $53@$51; Prime Western, $50; fines and slimes, $47.50@$45; calamine, basis 40 per cent zinc, $35. Average settling prices: Blende, $52.10; calamine, $37.64; all zinc ores, $51.42.

Lead, high, $106.20; basis 80 per cent lead, $105; average settling price, all grades of lead, $104.40 per ton.

Shipments the week: Blende, 10,614; calamine, 610; lead, 1,462 tons. Value, all ores the week, $727,700.

Shippers are again receiving cars more in proportion to their needs, but still can use a further increased supply. Purchases were light this week, buyers offering only $50 basis Prime Western, with sellers holding firm for higher figures.

Buyers with large advanced purchases and with hundreds of thousands of dollars paid the sellers, are more desirous of shipping than buying additional tonnage. Though approximately 20,000 tons of unsold ore has accumulated, there are 50,000 tons sold and partly paid for. Some buyers are now estimating that there is money advanced on around 20,000 tons that has not been produced, and they are getting anxious for a nearer approach to an accounting.

Platteville, Wis., March 13—High-grade blende remained unchanged at a nominal base of $52 to $54 per ton. Lead ore, basis 80 per cent lead, $105 per ton. Shipments for the week are: Blende, 1,290; calamine, 150; lead, 131 tons. Year to date: Blende, 16,259; calamine, 870; lead, 1,556, sulphur ore, 106 tons. During the week 2,225 tons blende was shipped to separating plants.

Iron Trade Review

Pittsburgh, March 16, 1920

Heavier deliveries of steel, due to increased production rather than better freight movement, are having the effect of reducing the nervousness of steel buyers, who are also encouraged by the counsels of conservative steel manufacturers and by their observation that the railroads are not buying any inordinate quantities of steel. The result is that buyers are not paying as fancy prices as formerly for prompt deliveries. If they do not get altogether enough, they operate at a somewhat restricted rate for a time. The highest price done on black sheets, prompt mill lots, was 10c, in the last week in February; in the last week the highest price obtained was 8c. Prices of other descriptions of steel for prompt shipment are a shade easier, but do not show the percentage decline that has occurred in sheets Sheet bars are also easier, at $70 to $80; two or three weeks ago $90 was paid.

A safe and sane market for steel products is thus gradually becoming assured, with enough steel to meet all requirements, and those investors in works of construction who have lately had little interest are likely to be encouraged to consider the matter of going ahead with their projects.

Pig Iron—The market is extremely quiet as to inquiries and transactions, and offerings, particularly by middle interests, are becoming conspicuous. On odd lots regularly quoted prices might perhaps be shaded 50c. or $1, whereas a few weeks ago foundry iron at any rate commanded several dollars' premium for prompt. The probability is that there will be a mild decline in pig iron, say within two or three months. We quote: Bessemer, $42; basic, $41.50; foundry, $42; malleable, $43.25, f.o.b. Valley furnaces, freight to Pittsburgh being $1.40.

MINING STOCKS

Week Ended March 13, 1920

Stock	Exch.	High	Low	Last	Last Div.
COPPER					
Adventure	Boston	*90	*90	*90	
Ahmeek	Boston	73	69	73	Dec. '19, $1.00
Alaska-B.C	N. Y. Curb	1⅛	1⅛	1⅛	
Algomah	Boston	*30	*30	*30	
Allouez	Boston	35	34	34	Mar. '19, 1.00
Anaconda	N. Y.	60⅜	57	59⅜	Feb. '20, 1.00
Ariz. Com'l	Boston	13	12	12¼	Oct. '18, .50
Big Ledge	N. Y. Curb	1/16	1/16	1/16	
Bingham Mines	Boston	7	7	7	Sept. '19, .25
Boston & Ely	Boston Curb			*55	
Butte & Bal	Boston	*35	*30	*30	
Butte & Lond	Boston Curb	*15	*10	†*10	
Calaveras	Boston Curb			1	
Calumet & Ariz	Boston	65½	60½	60½	Dec. '19, .50
Calumet & Hecla	Boston	375	340	350	Dec. '19, 5.00
Calumet & Jerome	N. Y. Curb			1/16	
Can. Copper	N. Y. Curb	1⅛	1⅛	1⅛	
Centennial	Boston	14	14	14	Dec. '18, 1.00
Cerro de Pasco	N. Y.	52	48	49⅜	Mar. '20, 1.00
Con. Ariz	N. Y. Curb			1/16	Dec. '18, .05
Con. Copper M	N. Y. Curb	4¼	4	4	
Chile Cop	N. Y.	17⅛	18⅛	16⅞	
Chino	N. Y.	35⅛	33⅛	33⅛	Dec. '19, .75
Cop. Range	Boston	44⅛	41⅛	42⅛	Dec. '19, .50
Crystal	Boston Curb	*37	*29	†*30	
Crystal Cop (old)	Boston Curb	*9	*4	†*4	
Daly-West	Boston	4⅜	4	4⅛	
Davis-Daly	Boston	10⅜	10⅛	10⅛	Dec. '19, .50
East Butte	Boston	15⅛	13⅛	14⅛	Dec. '19, .50
First Nat'l	Boston Curb	1⅛	1⅛	†1⅛	Feb. '19, .15
Franklin	Boston	3⅛	3⅛	3⅛	
Gadsden Copper	N. Y. Curb	1⅛	1⅛	1⅛	
Granby Consol	N. Y.	41⅛	37	40⅛	May '19, 1.25
Greene-Can	N. Y.	36	34½	36	Feb. '19, 1.50
Hancock	Boston	5	5	5	
Helvetia	Boston	3⅛	3⅛	3⅛	
Houghton	Boston Curb	*75⅛	*75	†*75	
Howe Sound	N. Y. Curb	4⅛	3⅞	4	Jan. '20, .05
Indiana	Boston	*75	*70	*75	
Inspiration Con	N. Y.	56⅞	53⅜	54⅛	Jan. '20, 1.50
Iron Cap	Boston Curb	11⅛	10⅞	†11	Feb. '19, .25
Isle Royale	Boston	33	31	31	Sept. '19, .50
Jerome Verde	N. Y. Curb			1/16	
Kennecott	N. Y.	32	28½	30	Dec. '19, .50
Keweenaw	Boston	1⅜	1⅜	1⅜	
Lake Copper	Boston	4	3⅜	4	
La Salle	Boston	2⅜	2⅜	2⅜	
Magma Chief	N. Y. Curb	⅛	⅛	⅛	
Magma Copper	N. Y. Curb	38⅛	37⅛	38⅛	Jan. '19, .50
Majestic	Boston Curb	*20	*15	†*15	
Mason Valley	N. Y. Curb	2⅛	2⅛	2⅛	
Mass Con	Boston	5⅛	4⅜	5	Nov. '17, 1.00
Mayflower	Boston	9⅛	8	8⅛	
Miami	N. Y.	23⅛	22	23⅛	Feb. '20, .50
Michigan	Boston	7⅛	7	7⅛	
Mohawk	Boston	68	62⅞	67	Feb. '20, 1.50
Mother Lode(New)	N. Y. Curb	5	5	5	
Nev. Con	N. Y.	15⅜	14⅛	14⅜	Dec. '19, .37½
Nixon Nev	N. Y. Curb			16	
Nev. Douglas	Boston Curb	*16	*10	†*10	
New Arcadian	Boston	3⅛	3⅛	3⅛	
New Baltic	Boston Curb	4	3	†3	
New Cornelia	Boston	22	20⅛	20⅛	Nov. '18, .25
North Butte	Boston	17⅛	15⅛	16⅛	Oct. '18, .25
North Lake	Boston	*50	*50	*50	
Ohio Copper	N. Y. Curb			1/16	
Oneco	Boston Curb	*100	*60	†*60	
Ojibway	Boston			2	
Old Dominion	Boston	34	31	32	Dec. '18, 1.00
Osceola	Boston	52⅛	48	52	Dec. '19, 1.00
Quincy	Boston	62	60	62	Feb. '20, 1.00
Ray Con	N. Y.	19⅛	18	18	Dec. '19, .50
Ray Hercules	N. Y. Curb			1⅛	
St. Mary's M. L	Boston	53	49⅛	51	Dec. '19, 2.00
Seneca	Boston	16	15	15⅛	
Shannon	Boston	2	1⅜	1⅜	Nov. '17, .25
Shattuck, Ariz	N. Y.	12⅛	11⅜	12⅛	Jan. '20, .25
South Lake	Boston	*30	*20	*30	
South Utah	Boston			*15	
Superior	Boston	5⅜	5⅛	5⅛	Apr. '17, 1.00
Superior & Boston	Boston	5⅛	4⅛	4⅛	
Tenn. C. & C	N. Y.	11⅛	9⅞	10⅛	May '18, 1.00
Trinity	Boston	1⅛	1⅛	1⅛	
Tuolumne	Boston	*99	*85	*90	
United Verd. Ex	Boston Curb	39⅛	37⅛	†38	Feb. '20, .50
Utah Cop	N. Y.	76⅛	71⅛	72⅛	Dec. '19, 1.50
Utah Con	Boston	8⅜	8⅛	8⅛	Sept. '18, .25
Utah M. & T	Boston	2⅝	2	2⅛	Dec. '17, .30
Victoria	Boston	3	3	3	
Winona	Boston	1⅜	1⅛	1⅜	
Wolverine	Boston	21⅛	20⅛	21⅛	Jan. '20, .50
LEAD					
Hecla	N. Y. Curb	4⅛	4⅛	4⅛	Dec. '19, .15
St. Joseph Lead	N. Y.	16⅛	16⅛	16⅛	Dec. '19, .25
Stewart	Boston Curb	*18	*16	†*16	Dec. '15, .05
Utah Apex	Boston	2⅛	2⅛	2⅛	Nov. '18, .25

*Cents per share. †Bid price on Mar. 13.

Stock	Exch.	High	Low	Last	Last Div.
ZINC					
Am. Z. L. & S	N. Y.	20⅛	18½	18⅜	May '17, 1.00
Am. Z. L. & S. pf	N. Y.	56	53	56	Feb. '20, 1.50
Butte C. & Z	N. Y.	10½	9½	9⅝	July, '18, .50
Butte & N. Y	N. Y. Curb			⅛	
Butte & Superior	N. Y.	28	25⅞	26⅛	Sept. '17, 1.25
Con. Interst. Cal	N. Y.	20	18⅜	19	June '18, .50
Natl. Z. & L	Boston Curb	*8	*6	†*6	May '17, .02
Success	N. Y. Curb	*6	*5	*5½	July '16, .03
GOLD					
Alaska Gold	N. Y.	2	1⅞	1⅞	
Alaska Juneau	N. Y.	2⅜	2	2⅛	
Booth	N. Y. Curb	6	5	6	
Carson Hill	N. Y. Curb	24	22	23⅛	
Cresson Gold	N. Y. Curb	2⅛	2⅛	2⅛	Dec. '19, .10
Dome Ex	Toronto	*29	*27	*27	
Dome Lake	Toronto	*10	*8	*8⅛	
Dome Mines	N. Y.	12⅛	12	12	Jan. '20, .25
Goldfield Con	N. Y. Curb	*14	*12	*13	Dec. '19, .05
Hedley	Boston			4⅛	June '19, .10
Hollinger	Toronto	6.55	6.50	6.60	Feb. '20, .05
Homestake	N. Y.	55	51	55	Feb. '20, .50
Kewanas	N. Y. Curb	*4	*2	*3	
Kirkland Lake	Toronto	*71	*70	*70	
McIntyre Porcupine	Toronto	2.10	2.08	2.08	Jan. '20, .05
Silver Pick	N. Y. Curb	*30	*16	*18	
Teck-Hughes	Toronto	*15½	*15	*15	
United Eastern	N. Y. Curb	4	3⅛	3⅛	Jan. '20, .21
West Dome	Toronto	*10⅛	*10	*10⅛	
White Caps	N. Y. Curb	17	12	15	
Yukon Gold	Boston Curb	1⅞	1⅛	†1⅛	June '18, .02½
SILVER					
Adanac	Toronto	*3⅛	*3⅛	*3⅛	
Bailey	Toronto	*6	*5	*5⅛	Apr. '16, .05
Beaver Con	Toronto	*62	*61	*61	
Coniagas	Toronto	3.00	2.90	90	Nov. '19, .12½
Crown Reserve	Toronto	*37	*35	35	Jan. '17, .05
Hargraves	Toronto	*4		*3⅞	
Kerr Lake	Boston	4⅛	3⅛	4⅛	Sept. '19, 1.00
La Rose	N. Y. Curb	⅜	1/16	⅜	Apr. '18, .02
McKinley-Dar	N. Y. Curb			61	Jan. '20, .03
Nipissing	N. Y. Curb	11⅛	10⅛	10⅛	Jan. '20, .50
Ontario Silver	N. Y.	8⅛	8	8⅛	Jan. '19, .50
Ophir Silver	N. Y. Curb	1⅛	1	1	
Peterson Lake	Toronto	*22	*20⅜	*20⅜	Jan. '17, .01½
Sil. King Ariz	N. Y. Curb	3/16	1/16	1/16	
Temiskaming	Toronto	*44	*42½	*42½	Jan. '20, .04
Trethewey	Toronto	*45½	*45	*45	Jan. '19, .05
GOLD AND SILVER					
Atlanta	N. Y. Curb	*3½	*2⅜	*3⅜	
Batopilas	Boston			1⅜	
Bost. & Mont	N. Y. Curb	*69	*62	*69	
Cashboy	N. Y. Curb	*9	*7⅛	*8⅛	
El Salvador	N. Y. Curb	3	2⅛	2⅛	
Goldfield Merger	N. Y. Curb	*4	*3	*4	
Jim Butler	N. Y. Curb	*25	*22	*23	Aug. '18, .07
Jumbo Extension	N. Y. Curb	*12	*8	*11	June '16, .05
Louisiana Con	N. Y. Curb	1/16	⅛	1/16	
McNamara Cr	N. Y. Curb	*1/16	*1/16	*1/16	
Nev. Packard	Boston Curb	*25			Apr. '19, .02
Rochester Mines	N. Y. Curb			*18	Oct. '18, .02
Tonopah-Belmont	N. Y. Curb	2⅛	2⅛	2⅛	Jan. '20, .05
Tonopah-Divide	N. Y. Curb	2⅛	2⅛	2⅛	
Tonopah Ex	N. Y. Curb	2⅛	2⅛	2⅛	Jan. '20, .05
Tonopah Mining	N. Y. Curb	2⅛	2⅛	2⅛	Oct. '19, .15
West End Con	N. Y. Curb	*2	*1⅛	*2	Dec. '19, .05
SILVER-LEAD					
Caledonia	N. Y. Curb	*36	*34	*35	Jan. '20, .01
Fed. M. & S	N. Y.	15⅛	13	15⅛	Jan. '09, 1.50
Fed. M. & S. pf	N. Y.	35⅛	30⅛	35	Dec. '19, .50
Iron Blossom	N. Y. Curb	1/16	⅛	⅛	Jan. '20, .02½
Marsh Mines	N. Y. Curb	*19	*16	*18	
Rex Con	N. Y. Curb	*10	*8	*9	
Simon S. L	N. Y. Curb			*1⅛	
Stand. S. L	N. Y. Curb			1/16	Oct. '17, .05
Wilbert	N. Y. Curb	10	6	8	Nov. '17, .10
NICKEL-COPPER					
Internat'l Nickel	N. Y.	22⅜	21	22	Mar. '19, .50
Internat'l Nick. pf	N. Y.	85	85	85	Feb. '20, 1.50
QUICKSILVER					
New Idria	Boston	6½	6½	6½	Jan. '19, .25
TUNGSTEN					
Mojave Tungsten	Boston Curb	*12	*8	†*8	
VANADIUM					
Vanadium Corpn	N. Y.	54⅜	47⅜	54⅜	
GOLD AND PLATINUM					
So. Am. G. & P	N. Y. Curb			8½	
MINING, SMELTING AND REFINING					
A. S. & R	N. Y.	68	62⅜	65⅜	Mar. '20, 1.00
A. S. & R., pf	N. Y.	94½	94	94½	Mar. '20, 1.75
Am. Sm. pf., A	N. Y.	81⅛	80½	80½	Jan. '20, 1.50
Natl. Lead	N. Y.	83⅛	77⅛	80	Dec. '19, 1.25½
Natl. Lead, pf	N. Y.	108	108	108	Mar. '20, 1.75
U. S. Sm. R. & M.	N. Y.	70	67	68⅛	Jan. '20, 1.50
U. S. Sm. R. & M., pf	N. Y.			45	Jan. '20, .87½

MINERALS AND METAL PRODUCTS

Miscellaneous Metallic Ores

Chrome ore, 35-40%, Cr_2O_3	unit	$0.60—	$0.85
Chrome ore, 48% and over	unit	.75—	1.25
Manganese ore, 45% Mn and over	unit	.75—	.85
Manganese ore, chemical (MnO_2)	gross ton	80.00—	90.00
Molybdenite, 85% MoS_2, per lb. of MoS_2	lb.	.75—	.85
Tungsten, scheelite, 60% WO_3, and over, per unit of WO_3	unit	9.00—	15.00
Tungsten, wolframite, 60% WO_3 and over, per unit of WO_3	unit	7.50—	10.00
Uranium oxide, 96%	lb.	2.75—	3.00
Vanadium pentoxide, 99%	lb.	6.00—	.....
Pyrites, foreign, lump	unit	.17—	.....
Pyrites, foreign, fine	unit	.17—	.....
Pyrites, domestic, fine	unit	.16—	.....
Ilmenite, 52% TiO_2	lb.	.02—	.....
Rutile, 95% TiO_2	lb.	.11—	.....
Carnotite, minimum 2% U_3O_8, per lb. of U_3O_8	lb.	2.75—	3.00

Ferro-Alloys

Domestic makers of ferro-manganese seem to be well sold up for the half year, while for the second half they are selling only in a limited way at their recently advanced price of $160, delivered, for 76 to 80 per cent alloy. English is quoted at $150 c.i.f. Spiegeleisen is quoted at $56 to $57, furnace, for 19 to 21 per cent.

Electrolytic ferro-silicon is quiet at $80 for 50 per cent and $140 for 75 per cent, delivered Pittsburgh, Valleys and Cleveland. Bessemer ferro-silicon is quoted at $59.50 for 10 per cent, $62.80 for 11 per cent and $66.10 for 12 per cent f.o.b. Jackson, Ohio.

Prices f.o.b. works, which as a protection to our sources of information, are not named. Freight rates are small items compared with the cost of the material.

Ferro-carbon-titanium, 15-18%, f. o. b. Niagara Falls, N. Y.	net ton	$200.00—	$250.00
Ferro-chrome, per lb. of Cr contained, 6-8% carbon	lb.	.20	.40
Ferro-chrome, per lb. of Cr contained, 2-4% carbon	lb.	.21	.50
Ferro-manganese, 70-80% Mn	gross ton	165.00—	175.00
Spiegeleisen, 16-20% Mn	gross ton	55.00—	65.00
Ferro-molybdenum, per lb. of Mo	lb.	2.50—	2.75
Ferro-silicon, 50%	gross ton	85.00—	95.00
Ferro-silicon, 75%	gross ton	150.00—	175.00
Ferro-silicon, 10–15%	gross ton	45.00—	60.00
Ferro-tungsten, 70–80%, per lb. of contained W	lb.	1.25—	1.40
Ferro-uranium, 35–50%, of U	lb.	7.00—	.....
Ferro-vanadium, 30–40% per lb. of contained V	lb.	5.50—	7.00

Metal Products

Quantity prices, mill lots:	Cents
Copper wire, net	22.25
Copper wire rods, black, net	21.25—21.50
Copper sheets	29.50
Copper in rolls	27.75
Copper bottoms	38.00
Copper rods, round	26.75
Copper rods, square and rect	27.50
High brass sheets and wire	25.25
High brass rods	23.75
Low brass sheets and wire	27.25
Low brass rods	28.00
Com. bronze, sheets and wire	29.00
Commercial bronze rods	30.00
Tobin bronze rods	29.50
Brazed tubing—brass	37.00
Brazed tubing—copper and commercial bronze	41.75
Nickel silver, 18%	39.50
Yellow metal dimension sheets	26.75
Yellow metal sheathing	25.75
Yellow metal rods, ⅜ to 3 in	23.75
Seamless high brass tubing	30.50
Seamless low brass tubing	33.00
Seamless copper tubing	32.00
Seamless com. bronze tubing	34.50
Seamless tobin bronze tubing	35.50
Seamless phosphor bronze tubes	46.00
Full lead sheets	12.25
Cut lead sheets	2.50
Zinc plates	12.00
Sheet zinc, f. o. b. smelter	12.50

Miscellaneous Non-Metallic Minerals

All prices, f.o.b., N. Y.

Barytes, domestic, white, floated	ton	$35.00 —	$40.00
Barytes, off color	ton	20.00 —	25.00
Blanc fixe, dry	lb.	.04 —	.05
Blanc fixe, pulp	ton	30.00 —	50.00
Chalk, English, extra light	lb.	.05 —	.07
Chalk, English, light	lb.	.04½ —	.06
Chalk, English, dense	lb.	.04 —	.05
China clay (Kaolin), imported, lump	ton	25.00 —	35.00
China clay (Kaolin), imported, powdered	ton	30.00 —	60.00
China clay (Kaolin), domestic, lump	ton	10.00 —	20.00
China clay (Kaolin), domestic, powdered	ton	25.00 —	40.00
Feldspar	ton	13.50 —	18.00
Fluorspar, acid grade, lump, f.o.b. mines	net ton	30.00 —	45.00
Fluorspar, acid grade, ground, f.o.b. mines	net ton	40.00 —	52.00
Fluorspar, gravel, f. o. b. mines	net ton	..... —	25.00
Fuller's earth, domestic, powdered	ton	25.00 —	30.00
Fuller's earth, imported, powdered	ton	35.00 —	40.00
Graphite, crucible, 85% carbon content	lb.	..... —	.07½
Graphite, crucible, 86% carbon content	lb.	..... —	.07½
Graphite, crucible, 87% carbon content	lb.	..... —	.07¾
Graphite, crucible, 88% carbon content	lb.	..... —	.08
Graphite, crucible, 89% carbon content	lb.	..... —	.08¼
Graphite, crucible, 90% carbon content	lb.	..... —	.08½
Graphite, crucible, 91% carbon content	lb.	..... —	.08¾
Graphite, crucible, 92% carbon content	lb.	..... —	.09
Graphite, crucible, plus 92%	lb.	..... —	.12
Monazite, per unit of ThO_2	unit	42.00 —	.....
Pumice stone, imported	lb.	.03 —	.06
Pumice stone, domestic	lb.	.02½ —	.....
Soapstone	ton	15.00 —	25.00
Talc, domestic	ton	16.00 —	60.00
Talc, imported	ton	60.00 —	70.00
Zircon, washed, iron free	lb.	.10 —	.....

Phosphate Rock

Export prices per long ton at Florida port

Phosphate rock, 68% tricalcium phosphate	$6.85
Phosphate rock, 70% tricalcium phosphate	7.35
Phosphate rock, 74@75% tricalcium phosphate	10.00
Phosphate rock, 75% min. tricalcium phosphate	10.50
Phosphate rock, 77% min. tricalcium phosphate	12.50

Asbestos

Per short ton f.o.b. Thetford, Broughton and Black Lake mines Quebec, Can. Freight rate from mines to Sherbrooke, Que., over Quebec Cen. R.R., 20c. per cwt.; from Sherbrooke to New York, 27½c., carload lots.

Asbestos, Crude No. 1	$17.50—	$20.00
Asbestos, Crude No. 2	11.00—	15.00
Asbestos, spinning fibres	5.00—	7.50
Asbestos, magnesia and compressed sheet fibres	2.50—	4.00
Asbestos, single stock	.95—	1.50
Asbestos, paper stock	.60—	.75
Asbestos, cement stock	.25—	.30
Asbestos, floats	.12—	.15

Coke

Current prices follow:

Connellsville, furnace	$6.00 —	.....
Connellsville, foundry	7.00 —	.....
Wise County, furnace	7.25 —	.....
Wise County, foundry	8.25 —	.....
Pocahontas, furnace	8.00 —	.....
New River, foundry	8.00 —	.....
New River, furnace	8.00 —	.....

Petroleum

Local prices for petroleum and products are given below (cents per gallon):

Refined, bbls., 150 fire test, dealers	26
Refined, tanks, wagon to store	18
Refined, Astral, barrels	28
Fuel oil, 28 @ 31 degrees	14½
Gas oil, 34 degrees	15½
Motor Gasoline:	
Garages (steel barrels)	26½
Consumers (steel barrels)	28½
Consumers (wood barrels)	32½
V., M. & P., deod., in steel	25½
V., M. & P., deod., in wood	33½
Gasoline:	
72-76 degrees, steel	36½
72-76 degrees, wood	42½
68-70 degrees, steel	33½
68-70 degrees, wood	39½
70-72 degrees, wood	40½
Gas machine, steel	45½
Fuel, merchantable, tanks	Nominal
Fuel oil, sellers' tanks, f. o. b. Bayonne:	
28@36 degrees	8 — 9
24@28 degrees	7 — 8
16@20 degrees	5½ — 6
14@16 degrees	4½ — 5

Mineral Lubricants

	Cents
Black—reduced, 29 gravity, 25@30 cold test, per gallon	25 — 35
29 gravity, 15 cold test	25 — 35
Summer	25 — 35
Cylinder—light filtered	65 — 75
Dark, filtered	65 — 75
Extra, cold test	75 — 95
Dark, steam refined	60 — 65
Bloomless—30@31 gravity	32 — 34
White, 30@31 gravity	45 — 60
885 specific gravity	25 — 26
Red paraffine	32 — 35
Paraffine—high viscosity	38 — 45
900 specific gravity	36 — 38
Spindle—No. 200	45 — 50
No. 180	36 — 38

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838—MANGANIN—M. A. Hunter and J. W. Bacon. (Advance copy, Am. Electrochem. Soc., Sept., 1919; 12¼ pp., illus.)

839—MANITOBA—Athapapuskow Lake District, Manitoba. E. L. Bruce. (Can. Geol. Surv., Summary Report 1918, Part D; 1¼ pp.)

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843—PRODUCTION of Copper. Adolph Bregman. First of a series of articles covering each of these Branches and Telling how the Metal Business is Conducted. (The Metal Industry, Jan. 1920, 6 pp., illust.)

844 — RHODESIA — Bwana M'Kubwa Copper Mine—Northern Rhodesia. E. M. Weston. (Journ. of Chem., Met. Min. Soc. of South Africa, Sept. 1919; 1¼ pp.)

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959—UTAH—The Farnham Anticline, Carbon County, Utah. Frank R. Clark. (U. S. Geol. Surv., Bull., 711-A; 13 pp., illus.) 20c.

960—VENEZUELA—The Maracaibo Oil Fields. (Bull., Pan American Union, Nov. 1919; 8 pp., illus.)

961—WYOMING—Oil in the Warm Springs and Hamilton Domes, near Thermopolis. A. J. Collier. (Contributions to economic geology, 1919—Part II; 12 pp., illus.)

ECONOMIC GEOLOGY—GENERAL

962—ALBERTA—Geology of the Swan Hills in Lesser Slave Lake District, Alberta. John A. Allen. (Can. Geol. Surv., Summary Report, 1918, Part C; 5½ pp.)

963—BRITISH COLUMBIA—Undeveloped Mineral Resources of the Clinton District, B. C. L. Reincke. (Bull., Can. Min. Inst., Aug., 1919; 5½ pp., illus.)

964—INDIA—On the Inclination of the Thrust-Plane or Reversed Fault, Between the Siwalik and Murree Zone of Formations, Near Kotli, Jammu Province. C. S. Middlemiss. (Rec., Geol. Surv. of India, July, 1919; 3½ pp.)

965—MANITOBA—Reed-File Lakes Area, Manitoba. F. J. Alcock. (Can. Geol. Surv., Summary Report, 1918, Part D; 3 pp.)

966—MEXICO—Apuntes Sobre El Mineral de Puerto de Nietro, Guanajuato. (Anales Instituto Geol. de Mexico, 1919, No. 6; 8 pp., illus.)

967—ONTARIO—The Canadian National Railways Between Longuelac and Oba, Northern Ontario. T. L. Tanton. (Can. Geol. Surv., Summary Report, 1918, Part E; 3 pp.)

968—ORE DEPOSITS—Present Tendencies in Geology: Metalliferous Deposits. Adolph Knopf. (Econ. Geol., Nov., 1919; 12 pp.) 60c.

969—SASKATCHEWAN—Surface Deposits of Southwestern Saskatchewan. J. Stanfield. (Can. Geol. Surv., Summary Report, 1918, Part C; 6 pp.)

MINING—GENERAL

970—ACCIDENTS—English Speaking vs. Non-English Speaking Employees. Albert H. Fay. (Min. & Sci. Press, Nov. 8, 1919; 5 pp.) Address before 8th Annual Safety Congress. 20c.

971—AUSTRALIA—The Mining Industry in. F. H. Bathurst. (Min. & Sci. Press, Jan. 31, 1920; 3 pp.)

972—BRITISH COLUMBIA—Review of Recent Developments in Metal Mining in Northern British Columbia. E. J. Conway. (Bull. Can. Min. Inst., Oct. 1919; 5½ pp.) 40c.

973—BRITISH COLUMBIA—Undeveloped Mineral Resources of the Clinton District, B. C. L. Reinecke. (Bull. Can. Min. Inst., Oct., 1919; 10¾ pp., illus.) Continuation.

974—CALIFORNIA—Review of Mining during 1919. Fletcher Hamilton. Preliminary Report No. 6; 43 pp.)

975—DRILLING—A Drill-Round Model. Walter S. Weeks. (Min. & Sci. Press, Dec. 13, 1919; 1 p., illus.)

976—EXPLOSIVES and Miscellaneous Investigations. (Advance chapter from Bull. 178, War Work of the Bureau of Mines; 18½ pp.)

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982—TAXATION—The Federal Taxation of Mines. L. C. Graton. (Min. & Sci. Press, Oct. 11 and 18, 1919; 8 pp.) Abstract from paper before A. I. M. E.

983—TAXATION—The Taxation of Mines in British Columbia. T. W. Bingay. (Bull. Min. Inst., Aug., 1919; 6 pp.)

984—WAR—History of Prices During. Summary. Wesley C. Mitchell. (War Industries Board Price Bull. No. 1; 89 pp., illus.)

985—WESTERN AUSTRALIA—Prospecting for Gold and Other Ores in Western Australia. C. M. Harris. (Bull. I. M. M., Oct., 1919; 14 pp.)

ORE DRESSING—GENERAL

986—CRUSHING—The Hornet Crushing Plant. Lloyd C. White. (Min. & Sci. Press, Nov. 1, 1919; 2 pp., illus.) 20c.

987—MINERALS SEPARATION v. Mining Industry. George L. Nye. (Min. & Sci. Press, Dec. 13, 1919; 8 pp.)

988—KOREA—Technical Operations on the Suan Concessions, Korea—IV. A. R. Weigall and J. F. Mitchell-Roberts. (Min. & Sci. Press, Dec. 13, 1919; 6 pp., illus.)

METALLURGY—GENERAL

989—ALUMINUM BRONZE—Further Progress in Ingot Production. Charles Meigh. (Metal Ind., Dec., 1919; 2¾ pp., illus.) Casting at low temperatures.

990—BRASSES—Study of the Relation Between Various Physical Properties of Beta Brasses as the Annealing and Quenching Temperature Varies. (Chem. & Met. Engrg., Feb. 4, 1920; 7 pp., illus.)

991—BRONZE AND BABBITT BEARINGS, Notes on. W. K. Frank. (Proc. Eng. Soc. of W. Penn., Nov., 1919.)

992—CERAMIC INDUSTRIES—Application of Pyrometry to the Ceramic Industries. C. B. Thwing. (A. I. M. M. E., Sept., 1919; 3½ pp.)

993—ELECTRIC FURNACE SMELTING—Investigations to Determine the Best Arrangement of Electrodes, Leads, etc. F. Holmgren. (Chem & Met. Eng., Jan. 28, 1920; 8 pp., illus.)

994—MELTING—Waste in Melting Alloyed Metals. E. H. Schultz and H. Winkler (Metal Ind., Dec., 1919; 1½ pp.) Translated from Metall und Erz.

995—PYROMETER PROTECTION TUBES. F. A. Harvey. (Bull. A. I. M. E., Sept., 1919; 2 pp.)

996—PYROMETRY—Teaching Pyrometry in Our Technical Schools. George V. Wendell. (Bull. A. I. M. E., Sept., 1919; 9¼ pp.)

997—RESEARCH—Department of Metallurgical Research State School of Mines, University of Utah. Thomas Varley, F. G. Moses, R. H. Bradford and R. S. Lewis. (Bull. Univ. Utah, Sept., 1919; 40 pp., illus.)

998—REFRACTORIES—Analyzing Firebrick Mortar. Raymond M. Howe. (Iron Trade Review, Feb. 5, 1920; 3 pp., illus.)

999—SAFETY—Glasses for Protecting the Eyes from Injurious Radiation. W. W. Coblentz & W. B. Emerson. (U. S. Bur. Stand., Tech. paper No. 93; 15 pp., illus.)

1000—SMELTING—PLANT DESIGN, Elements of—Pt. I. Oliver E. Jager. (Min. & Sci. Press, Jan. 31, 1920; 5 pp.)

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SAMPLING AND ASSAYING

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FUELS

(See also "Iron and Steel," "Petroleum")

1009—COAL in 1917, Part A. Production. C. E. Lesher. (Mineral Resources of the U. S., 1917—Part II; 146 pp., illus.)

1010—COAL in 1917. Part B. Distribution and Consumption. (Mineral Resources of the U. S., 1917—Part II. Washington, 1919; 64 pp.)

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INDUSTRIAL CHEMISTRY

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MATERIALS OF CONSTRUCTION

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MISCELLANEOUS

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1035—CHILE—Commercial and Industrial Education in Chile. Felix Nieto Del Rio. (Bull. Pan-American Union, Aug., 1919; 4 pp., illus.) 40c.

1036—ÉCOLE DES MINES—[The reorganization of The National Higher School of Mines and of the Mining School at St. Etienne]. (Jour. Officiel, Paris, Sept. 28, 1919. 106 pp. Abstract in Mois Sci. et Industriel, Oct.-Nov. 1919, 1 p.) 20c.

1037—EXPLOSIONS—Mine Explosions Due to Lightning. (So. Afr. M. and Eng. Jour. Feb. 7, 1920. ½ p.)

1038—FLOW OF WATER—The Orifice as a Means of Measuring Flow of Water Through a Pipe. Raymond E Davis & Harvey H. Jordan. (Bull., University of Ill., Vol. 16, No. 14, Dec. 2, 1919; 51½ pp., illus.)

1039—HUMAN ELEMENT in Mine Operation. Edwin Higgins. (Min. and Sci. Press. Mar. 6, 1920. 3 pp.) 35c.

1040—INDUSTRIAL AGREEMENT [entered into by Western Australia Mining Companies]. (Mo'ly. Jour., Chamber of Mines of W. Australia, Sept. 30, 1919. 7 pp.) 80c.

1041—INDUSTRIAL RELATIONS—Future of Industrial Relations. Dudley R. Kennedy. (Indus. Management, Mar. 1920. 4 pp.)

1042—INDUSTRIAL RELATIONS—Preparing Industrial English Lessons. Geo. F. Quimby and Chas. H. Paull. Indust. Management, Mar. 1920. 5½ pp. illus.)

1043—LABOR—La Situation des Industries Belges en Decembre 1919. (Belgium Minist. de l'Industrie, Bruxelles, 1919. 41 pp. tables. Statistical study of conditions of employment in mines, quarries and works.)

1044—LABOR—The Dust Hazard in the Abrasive Industry. C. E. A. Winslow and others. (U. S. Reprints from Publ. Health Reports. No. 530. May 30, 1919; 18 pp., illus.)

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1052—PIPE LINE—Laying a Pipe Line in Frozen Ground. William W. Elmer. (Eng. and Min. Journ., Nov. 22-29, 1919; 1 p., illus.)

1053—POWER—The Power Situation after the War. C. A. Winder. Advance copy. (Amer. Electrochemical Soc., Oct. 1 1919; 9¼ pp.)

1054—POWER in Alberta—Water, Coal and Natural Gas. James White. (Commission of Conservation, Ottawa, 1919; 30 pp., illus.)—Read at the Industrial Congress, Calgary, Aug. 11-16, 1919.

1055—UNION OF SOUTH AFRICA—Half Yearly Abstract of Union Statistics: No. 1—June 1919. Union of So. Africa, Office of Census and Statistics. (Johannesburg. 96 pp. Tables. First of a series of semi-annual publications. 50c.

1056—WEIGHTS AND MEASURES of the Far East. (Trans-Pacific, Nov., 1919 2 pp.)

CURRENT PRICES OF MATERIALS AND SUPPLIES

IRON AND STEEL

SHEETS—Quotations are in cents per pound in various cities from warehouse also the base quotations from mill:

Blue Annealed	Large Mill Lots Pittsburgh	St. Louis	Chicago	San Francisco	New York — Current	New York — One Yr. Ago
No. 10	3.55–4.00	4.64	4.82	5.80	$5.32-7.00	5.17
No. 12	3.60	4.69	4.67	5.75	5.37–7.10	5.22
No. 14	3.65–4.10	4.74	4.92	5.90	5.42	5.27
Black:						
Nos. 18 and 20	4.15–4.65	5.24	5.80	6.75	6.80–7.30	6.02
Nos. 22 and 24	4.20–4.70	5.29	5.85	6.80	6.85–7.35	6.07
No. 26	4.25–4.75	5.34	5.90	6.95	6.90–7.90	6.12
No. 28	4.35–4.85	5.67	6.00	7.05	7.00–8.00	6.22
Galvanized:						
No. 10	4.70	5.79	5.97	....	6.90	6.87
No. 12	4.80	5.89	6.07	7.30	6.95	6.92
No. 14	4.80	5.89	6.07	7.30	7.10	6.97
Nos. 18 and 20	5.10	6.19	6.37	7.60	7.40	7.27
Nos. 22 and 24	5.25–5.75	6.34	6.52	7.75	7.80	7.12
No. 26	5.40–5.90	6.49	6.95	7.90	7.95	7.27
No. 28	5.70–6.20	7.04	7.25	8.20	8.25–9.00	7.57

STEEL RAILS—The following quotations are per gross ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Pittsburgh — Current	Pittsburgh — One Year Ago	Chicago — Current	Chicago — One Year Ago
Standard bessemer rails	$45.00	$55.00	$45.00	$65.00
Standard openhearth rails	47.00	57.00	47.00	67.00
Light rails, 8 to 10 lb.	2.585*	3.135*	2.585*	3.135*
Light rails, 12 to 14 lb.	2.54*	3.09*	2.54*	3.09*
Light rails, 25 to 45 lb.	2.45*	3.00*	2.45*	3.00*

*Per 100 lb.

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh — Current	Pittsburgh — One Year Ago	Chicago	St. Louis	San Francisco
Standard railroad spikes, ⅜ in. and larger	$3.35	$3.70	$3.62	$4.44	$5.65
Track bolts	4.90–5.10	4.90	4.62	Premium	6.65
Standard section angle bars	2.75	3.25	2.75	3.44	4.60

STRUCTURAL MATERIAL—The following are the base prices f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the $2.55 places named:

	Mill Pittsburgh	New York — Current	New York — 1 Year Ago	St. Louis	Chicago
Beams, 3 to 15 in.	$2.45	$3.97	$4.07	$4.04	$3.97
Channels, 3 to 15 in.	2.45	3.97	4.07	4.04	3.97
Angles, 3 to 6 in., ¼ in. thick	2.45	3.97	4.07	4.04	3.97
Tees, 3 in. and larger	2.45	4.02	4.12	4.04	4.02
Plates	2.65	4.17	4.27	4.24	4.17

STEEL SHEET PILING—The following price is base per 100 lb. f.o.b. Pittsburgh, with a comparison of a month and a year ago:

Current	One Month Ago	One Year Ago
$2.55@$3.65	$2.55	$3.50

RIVETS—The following quotations are per 100 lb.:

STRUCTURAL

	Mill Pittsburgh	New York — Current	New York — One Year Ago	Warehouse — Chicago	Warehouse — St. Louis	Warehouse — San Francisco	Warehouse — Dallas
½ in. and larger	$4.50	$6.00	$5.67	$4.97	$5.44	$6.65	$7.50
CONE HEAD BOILER							
½ in. and larger	4.60	6.10	5.77	5.07	5.54	6.75	7.50
⅜ and ⅝	4.75	6.25	5.92	5.22	5.54	7.00	7.50
½ and ⅝	5.00	6.00	6.27	5.27	5.54	7.25	7.75

Lengths shorter than 1 in. take an extra of 50c. Lengths between 1 in. and 2 in. take an extra of 25c.

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Hercules red strand, all constructions	20%
Patent flattened strand special and cast steel	20%
Patent flattened strand iron rope	5%
Plow steel round strand rope	35%
Special steel round strand rope	30%–10%–5%
Cast steel round strand rope	22½%
Iron strand and iron tiller	5%
Galvanized iron rigging and guy rope	+12%

San Francisco: Galvanized, less 5%, bright, less 25%.
Chicago, + 12½ on galvanized, 30½ off on bright.

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill Pittsburgh	Cincinnati	Chicago	St. Louis	Birmingham
Straight	$5.75	$7.50	$7.00	$7.25	$7.00
Assorted	5.85	7.50	7.15	7.50	7.25

BAR IRON AND STEEL—Per 100 lb. to large buyers at mill, Pittsburgh:

Iron bars	$4.00	Steel bars	$3.00

COAL BIT STEEL—Warehouse price per pound is as follows:

New York	Cincinnati	Birmingham	St. Louis	Chicago
$0.10	$0 16½	$0.18	$0.11	$0.15

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham
Solid	14c.	13c.	15c.
Hollow	16c.	.....	.....

STEEL AND IRON PIPE—The following discounts are for carload lots on the Pittsburgh, basing card, discounts on steel pipe, applying as from January 14, 1920, and on iron pipe from January 7, 1920.

BUTT WELD

Inches	Steel Black Per Cent.	Galvanized Per Cent.	Inches	Iron Black Per Cent.	Galvanized Per Cent.
⅛ to 3	54	41½	⅛ to 1¼	34½	18½
LAP WELD					
2	47	34½	1¼	24½	9½
2½ to 6	50	37½	1½	31½	17½
7 to 12	47	33½	2	28½	14½
13 and 14	37½	....	2½ to 6	30½	17½
15	35	....	7 to 12	27½	14½
BUTT WELD, EXTRA STRONG, PLAIN ENDS					
⅛, ¼ and ⅜	43	25½	⅛	+7	+40
½	48	35½	¼	23½	6½
¾ to 1¼	52	39½	⅜	28½	15½
2 to 3	53	40½	½ to 1½	34½	19½
LAP WELD, EXTRA STRONG, PLAIN ENDS					
2	45	33½	1½	21½	6½
2½ to 4	48	36½	1¾	27½	13½
4½ to 6	47	35½	2	29½	16½
7 to 8	43	29½	2½ to 4	31½	19½
9 to 12	38	24½	4½ to 6	30½	18½
			7 to 8	22½	10½
			9 to 12	17½	5½

From warehouses at the places named the following discounts hold for steel pipe:

Black	New York	Cleveland	Chicago
⅛ to 3 in. butt welded	40%	40%	54%
3½ to 6 in. lap welded	35%	42%	50%
Galvanized	**New York**	**Cleveland**	**Chicago**
⅛ to 3 in. butt welded	24%	31%	40½%
3½ to 6 in. lap welded	20%	27%	37½%

Malleable fittings, Class B and C, from New York stock sell at list plus 22½%. Cast iron, standard sizes, net.

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Hot pressed square	+$2.00	$0.80	$1.00	$1.25	$1.25	$0.98
Hot pressed hexagon	+ 2.00	0.80	1.00	1.10	1.25	0.78
Cold punched square	2.00	2.50	1.00	1.00	.90	1.00
Cold punched hexagon	2.00	2.50	1.00	1.00	.90	1.00

Semi-finished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	60%	50-10%
Chicago	50%	50%
Cleveland	60–10%	60%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
¾ by 4 in. and smaller	25%	50%	35–5%
Larger and longer up to 1 in. by 30 in.	15%	40%	25–5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:
New York..... $1.50 Cleveland..... $4.50 Chicago..... $3.00
For cast-iron washers the base price per 100 lb. is as follows:
New York..... $7.00 Cleveland..... $3.75 Chicago..... $4.25

CONSTRUCTION MATERIALS

ROOFING MATERIALS—Prices per ton f.o.b. New York and Chicago:

	Carload Lots N. Y.	Carload Lots Chicago	Less Than Carload Lots N. Y.	Less Than Carload Lots Chicago
Tar felt (14 lb. per square of 100 sq.ft.)	$89.00	$87.00	$91.00	$89.00
Tar pitch (in 400-lb. bbl.)	21.00	18.00	22.00	19.00
Asphalt pitch (in barrels)	34.00	34.00	37.50	37.50
Asphalt felt	88.00	88.00	90.00	90.00

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York, St. Louis, Chicago and San Francisco:

	1-Ply c.l.	1-Ply l.cl.	2-Ply c.l.	2-Ply l.cl.	3-Ply c.l.	3-Ply l.cl.
No. 1 grade	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25
No. 2 grade	1.70	1.95	2.15	2.40	2.50	2.75

Asbestos asphalt-saturated felt (14 lb. per square) costs $170 per ton.
Slate-surfaced roofing (red and green) in rolls of 108 sq.ft. costs $3.00 per roll in carload lots and $3.25 for smaller quantities.
Shingles, red and green slate finish, cost $7.25 per square in carloads, $7.50 in smaller quantities, in Philadelphia.

HOLLOW TILE—

	4 x 12 x 12	8 x 12 x 12	12 x 12 x 12
St. Paul	$0.087	$0.158	$0.248
Seattle	.09	.175	.30
Los Angeles	.082	.154	.236
New Orleans	.165	.22	.325
Cincinnati	.101	.18925	.2864
Birmingham	.072	.135	.....
St. Louis	.08	.15	.....

LUMBER—Price per M in carload lots:

	8 x 8-In. x 20-Ft. and Under				12 x 12-In. 20-Ft. and Under	
	P.	Fir	Hemlock	Spruce	P.	Fir
Boston	$75.00	$65.00	$65.00	$60.00	$110.00	$100.00
Kansas City	53.00	52.25	52.25	52.25	64.00	52.25
Seattle	.....	31.00	.....	.....	.....	31.00
New Orleans	55.00	.....	.....	.....	65.00	.....
St. Paul	62.00	61.00	61.00	47.50	43.00	58.00
Atlanta	62.50	64.50	66.00	76.00	79.50	82.00
Baltimore	75.00	.....	.....	.....	87.50	.....
Cincinnati	55.00	55.00	55.00	.....	62.50	60.00
Montreal	73.00	68.00	65.00	60.00	73.00†	73.00
Los Angeles*	.....	59.50	58.00	.....	.....	51.00

	1-In. Rough, 10-In. x 16-Ft. and Under		2 In. T. and Gr. 10 In. x 16 Ft.	
	P.	Hemlock	P.	Fir
Boston	$70.00	$60.00	$80.00	$65.00
Kansas City	115.25	89.75	117.25	92.75
Seattle	.....	35.00	.....	36.00
New Orleans	60.00	.....	65.00	.....
St. Paul	54.00	54.00	64.50	58.50
Atlanta	85.00	90.00	77.50	87.50
Baltimore (box)	60–65.00	.....	60–65.00	.....
Cincinnati	60.00	58.00	55.00	55.00
Montreal	65.00	65.00	66.00	66.00
Los Angeles*	.....	57.00	56.00	.....

* Base price, 2 x 4, is $53, Los Angeles.
† Montreal—Up to 32-ft., over which, $3 per M. increase up to 36-ft.

NAILS—The following quotations are per keg from warehouse:

	Mill Pittsburgh	St. Louis	Dallas	Chicago	San Francisco
Wire	$4.50	$4.50	$6.90	$4.15	$5.50
Cut	4.925	5.40	7.40	7.00	6.90

PORTLAND CEMENT—These prices are for barrels in carload lots, without bags.

	Current	One Month Ago	One Year Ago With Bags
New York (delivered)	$2.80	$2.80	$3.45
Jersey City (delivered)	2.47	2.47	3.62
Boston	2.42	2.42	3.57
Chicago	2.00	2.00	3.05
Pittsburgh	2.05	2.05	3.15
Cleveland	2.32	2.32	3.32

NOTE—Charge for bags is generally 15c. each, 60c. per bbl.

LIME—Warehouse prices:

	Hydrated per Ton		Lump per 200-lb. Barrel	
	Finished	Common	Finished	Common
New York	$17.50	$14.50	$2.75*at plant	$2.55*
Kansas City	26.00	25.00	2.50	2.40
Chicago	20.50	14.50	2.25	1.50
St. Louis	22.00	18.00	.....	2.00
Boston	26.00	19.00	4.00*	3.50*
Dallas	30.00	.....	2.75	.....
San Francisco	20.00	16.00	.....	2.30†
St. Paul	24.00	19.00	1.60	1.50
New Orleans	.....	17.50	.....	2.20
Atlanta	.....	22.00	.....	2.40

NOTE—Refund of $0.10 per barrel.
* 300-lb. barrels. † 180-lb. barrels.

LINSEED OIL—These prices are per gallon:

	New York		Chicago	
	Current	Year Ago	Current	Year Ago
Raw per barrel (5 bbl. lots)	$1.80	$1.50	$1.98	$1.66
5-gal. cans	2.00	1.65	2.23	1.86

WHITE AND RED LEADS—500-lb. lots sell as follows in cents per pound:

	Red				White	
	Current		One Year Ago		Current Dry and	1 Yr. Ago Dry and
	Dry	In Oil	Dry	In Oil	In Oil	In Oil
100-lb. keg	15.50	17.00	13.00	14.50	15.50	13.00
25- and 50-lb. kegs	15.75	17.25	13.25	14.75	15.75	13.25
12½-lb. keg	16.00	17.50	13.50	15.00	16.00	13.50
5-lb. cans	18.50	20.00	15.00	16.50	18.50	15.00
1-lb. cans	20.50	22.00	16.00	17.50	20.50	16.00

MINING AND MILLING SUPPLIES

HOSE—

	FIRE
Underwriters' 2½ in.	50-Ft. Lengths $0.75 per ft.
Common, 2½-in.	.40

	AIR		
	First Grade	Second Grade	Third Grade
¾-in. per ft.	$0.50	$0.33	$0.22

STEAM—DISCOUNTS FROM LIST

First grade..... 30% Second grade.... 40% Third grade..... 45%

LEATHER BELTING—Present discounts from list in the following cities are as follows:

	Medium Grade	Heavy Grade
New York	20%	25%
St. Louis	40%	35%
Chicago	45%	40%
Birmingham	35%	30%
Cincinnati	30–5–2½%	40–2½%

RAWHIDE LACING—25% off for cut: $0.86 per sq.ft. for ordinary.

MANILA ROPE—For rope smaller than ¾-in. the price is ¼ to $0.02 extra while for quantities amounting to less than 600 ft. there is an extra charge of $0.01. The number of feet per pound for the various sizes is as follows: ⅜-in., 8 ft., ½-in., 6; ⅝-in., 4½; ¾-in., 1½-in., 2 ft. 10 in.; 1½-in., 2 ft. 4 in. Following is price per pound for ¾ in. and larger, in 1200-ft. coils:

Boston	$0.30	Kansas City	.265
New York	.26	New Orleans	.255
Cincinnati	.275	Seattle	.31
Chicago	.265	St. Louis	.265
St. Paul	.275	Atlanta	.295
San Francisco	.24		

PACKING—Prices per pound:

Rubber and duck for low-pressure steam	$1.00
Asbestos for high-pressure steam	1.70
Duck and rubber for piston packing	1.00
Flax, regular	1.20
Flax, waterproofed	1.70
Compressed asbestos sheet	.90
Wire insertion asbestos sheet	1.50
Rubber sheet	.50
Rubber sheet, wire insertion	.70
Rubber sheet, duck insertion	.50
Rubber sheet, cloth insertion	.30
Asbestos packing, twisted or braided and graphited, for valve stems and stuffing boxes	1.30
Asbestos wick, ½- and 1-lb. balls	.85

REFRACTORIES—Following prices are f.o.b. works:

Chrome brick	net ton	$75–$80	at Chester, Penn.
Chrome cement	net ton	45–50	at Chester, Penn.
Clay brick, 1st quality fireclay	1000	38–45	at Clearfield, Penn.
Clay brick, 2nd quality	1000	33–35	at Clearfield, Penn.
Magnesite, dead burned	net ton	50–55	at Chester, Penn.
Magnesite brick, 9x4½x2½ in.	net ton	80–85	at Chester, Penn.
Silica brick	1000	45–50	at Mt. Union, Penn.

Standard size fire brick, 9x4½x2½ in. The second quality is $4 to $5 cheaper per 1000.
St. Louis—Fire clay, $35 to $50.
Birmingham—Silica, $50; fire clay, $45; magnesite, $85; chrome, $85.
Chicago—Fire clay, high grade $50, standard $40.
Denver—Silica, $18; fire clay, $12; magnesite, $57.50.

RAILWAY TIES—For fair size orders, the following prices per tie hold:

Material	7 In. x 9 In. by 8 Ft. 6 In.	6 In. x 8 In. by 8 Ft.
Chicago—Plain	$1.75	$1.60
Chicago, creosoted	1.95	1.80
San Francisco—Douglas fir, green	1.74	1.24
San Francisco—Douglas fir, creosoted	3.36	2.38

Prices per tie at Missouri mills; St. Louis prices about 25c. higher:

Untreated A Grade White Oak 6x8x8		Untreated A Grade Red Oak 6x8x8	
No. 1	$0.70	No. 1	$0.55
No. 2	.80	No. 2	.65
No. 3	.90	No. 3	.75
No. 4	.98	No. 5	.87
7x9x8 white oak	1.05		
7x9x8 red oak, No. 4	.80		

FLOTATION OILS—Prices of oils for flotation, in cents per gal. in bbls.:

	New York	Chicago	
		In Bbl.	Carloads
Pure steam-distilled pine oil, sp.gr. 0.93–0.94	$1.45	$1.60	$1.55
Pure destructively distilled pine oil	.....	1.50	1.45
Pine tar oil, sp.gr. 1.025-1.035	.40	.42	.405
Crude turpentine, sp.gr. 0.900–0.970	1.60	2.31	2.20
Hardwood creosote, sp.gr. 0.96–0.99*	.35	.....	.....

*F. o. b. Cadillac, Mich.

COTTON WASTE—The following prices are in cents per pound:

	New York		Cleveland	Chicago
	Current	One Year Ago		
White	13.00	11.00–13.00	16.00	11.00–14.00
Colored mixed	9.00–12.00	8.50–12.00	12.00	9.50–12.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

	13½x13½	13½x13½
Cleveland	$52.00	$58.00
Chicago	41.00	43.50

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25 lb. keg for black powder:

	Low Freezing 20%	Gelatin 40%	Gelatin 60%	Gelatin 80%	Black Powder
New York	.....	$0.3125	$0.3425	.....	$2.30
Boston	$0.225	.245	.25	.35	2.40
Kansas City	.235	.26	.385	.3275	2.35
New Orleans	.2375*	.2275	.255	.....	2.90
Seattle	.1425	.185	.21	.315	1.90
Chicago	.215	.24	.2825	.325	2.35
St. Paul	.185	.2275	.2525	.295	2.25
St. Louis	.2175	.26	.285	.295	1.90
Denver	.205	.2475	.2725	.315	2.50
Dallas	.189	.....	.288	.342	2.75
Los Angeles	.25	.30	.35	.275	3.00
Atlanta	.22	.245	.265	.....	2.55
Baltimore	.225	.2675	.3075	.325	2.35
Cincinnati	.215	.26	.26	.....	2.20
Montreal	.28	.31	.34	.38	3.90

* For 50%.

CHEMICALS

SODIUM CYANIDE—New York price is 30c. per lb.; Chicago, 31½c.; St. Louis, 31c; Birmingham, 45c.

SODIUM SULPHIDE—New York price per pound is 6c. for concentrated, Chicago, 6c. for concentrated, 3c. for crystals. Birmingham price is 35c. for crystals. Concentrated comes in 500-lb. drums; crystals in 440-lb. bbl.

ZINC DUST—For 350 mesh the New York price is 12c. per lb.; Chicago, 13c.; St. Louis, 12c; Birmingham, 35c.

ALUMINUM DUST—Chicago price is $1.10 per lb.; Pirmingham, $1.52.

MINERS' LAMP CARBIDE—Prices net f.o.b. cars at warehouse points.:

	Union 100-Lb. Drums Per Ton	Cameo 100-Lb. Drums Per Ton	Union 25-Lb. Per Ton
East of the Mississippi, North of Chattanooga	$106.00	$101.00	$1.52
Southeastern portion U. S. A.	115.50	110.50	1.63
Texas (except El Paso)	124.00	119.00	1.74
El Paso, Texas	126.00	121.00	1.77
Denver, Colo.	124.00	119.00	1.74
West Coast	129.00	124.00	1.81